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## ORIGINAL ARTICLES.

### THE MODERN SMALL-ARM PROJECTILE AND THE WOUND IT INFILCTS; A REPORT OF FIFTY CASES.<sup>1</sup>

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THE evolution of the modern small-arm and its projectile marks an epoch in the history of ballistics. The changes wrought have been so radical and complete that armies have revised their tactics to meet the new conditions. Fifty years ago the old lead bullet was effective at two hundred yards. The modern rifle will fire forty shots per minute, and kill a man or a horse at two-and-one-quarter miles' range. It will be readily seen that with the advent of so powerful a weapon, with projectile modified in weight, diameter, and velocity, there must arise a difference in the injury produced and in the treatment indicated. With the progress of these engines of destruction the progress of surgery has mercifully kept pace. In the treatment of gunshot wounds to-day the surgeon achieves his most brilliant successes. In pre-antiseptic days septicemia and hospital gangrene were the shadows that hung about the cot of every wounded soldier.

Antiseptic methods and the use of the modern small-caliber bullet has radically changed the treatment of gunshot wounds, and renders possible the saving of lives and limbs as well as the restoration of useful function in a large proportion of cases. The study of gunshot wounds has received the attention of our ablest surgeons. During the War of the Rebellion the recorded results in the light of present knowledge only showed the limitations and imperfections of our art. With the discovery of Lister and the perfection of the small-arm, their study has received a new impetus and surgical practice, radical modifications.

Experimental research upon the cadaver has been carried on exhaustively. The results in actual warfare have been carefully studied during the British wars in India, the Graeco-Turkish war, and of late during our own experience at Santiago. The results of many of the elaborate experiments of De-

lorme and Chavasse, Von Coler and Bruns have been verified in actual warfare, while Longmore and Stevenson, La Garde, and Senn have made invaluable contributions to the surgical literature of this subject. The purpose of the modern small-arm is to render as many men as possible *hors de combat* in the shortest space of time. It is not intended to mutilate tissue or even to destroy life. It is to accomplish the purpose in as humane a manner as is compatible with its mission. Its intent primarily is not to destroy the soldier, but to destroy the soldier's fighting capacity. How well the modern rifle accomplishes this purpose may be seen as we study some of the wounds which it inflicts. For "whatever increases in a marked degree the velocity of movement, force, and range of projectiles, whether it be alterations in the projectiles themselves or in the firearms from which they are discharged, changes proportionately the features of the injuries inflicted by them, and within certain limits the treatment necessary for their cure."

*General Characteristics of the Modern Small-arm and Its Projectile.*—In describing the modern small-arm it will be unnecessary to describe any particular make. Whether it be the Mannlicher of Austria, the Mauser of Spain, the Lee-Metford of England, or the Krag-Jörgensen of the United States, while differing in certain details they possess in common fundamental characteristics, *vis.:* they are rapid fire, of small rifled bore, and of extremely long range. The bullet averages about thirty caliber. It is composed of a core of lead, over which is a steel jacket with a thin covering of nickel to take the rifling. The gun can discharge forty shots per minute, with a muzzle velocity of 2000 feet per second, and an effective range of 4000 yards. The path which the bullet takes from the time it leaves the gun to its first point of impact is its trajectory, and this line has two motions, a motion forward and a motion of rotation.

Experiments upon the cadaver and the experience of actual warfare have shown that the severity of the bullet injury differs with the range at which the bullet strikes. In general, the severity of the injury decreases with the range. Authorities agree that in the trajectory of the bullet we may recognize at least three zones, the bullet injury differing in each zone. It is impossible to accurately define these zones. The lines of demarcation are imaginary.

<sup>1</sup> Read before the Brooklyn Surgical Society, October 6, 1898.

The bullet injuries are strikingly characteristic. The first division is known as the explosive zone. The bullet upon impact is said to have an explosive action, and causes terrific destruction to tissue. Bruns, whose investigations in this field have been most thorough, limits the explosive zone to 350 yards. To get a fair idea of the damage wrought in this zone, we may refer to the experiment of Von Coler, who thus describes the effect upon a full skull fired at from fifty-four yards: "The skull was completely shattered; the bones and scalp were torn into the smallest atoms, and scattered in all directions. The entire base of the skull was broken up into separate pieces of bone, the lines of fracture of which only partially corresponded to the natural sutures. There was nothing left of the brain but a pulpy substance mixed with fragments of bone, in which some individual convolutions of the brain could still be recognized."

The cause of this explosive action suggests an interesting query. Of the various explanations offered it will be sufficient to mention three. Lydston offers an ingenious solution in his analogy to the theory of the spinning top. At first the top not only rotates upon its axis but at the same time revolves about a point. It then settles down to a steady spin upon a fixed point, and finally begins to wobble as it loses its impetus. While in the steady spin upon a fixed point and the final wobbling we may see the analogy to the action of the bullet in its middle and ultimate zones, it is highly improbable that its explosive effect is due to the dual motions of rotation and revolution. The bullet receiving its impulse from behind can have but two motions—one of rotation, the other of translation. The top receiving its impulse from the side takes on for a moment the additional motion of revolution about a point.

The theory of hydraulic pressure has many eminent adherents. It is found that when a projectile is fired at a tin vessel sealed, that in addition to the holes of entrance and exit, there has been produced a twisted and torn condition in the sides of the vessel due to the pressure communicated to the liquid within. The tissues of the body are analogously considered as vessels composed largely of water, and the terrific destruction is due to the increase of pressure communicated by the bullet to the incompressible contents of the part struck. Von Coler has shown that these conclusions are defective, for he has demonstrated that similar destruction is caused by a bullet to the walls of a vessel filled with water but open at the top. Von Coler's conclusions have been verified by Stevenson, who found that it was immaterial whether the vessel were opened or closed,

the destructive effects observed being the same. He therefore excludes the hydraulic theory as a scientific explanation, and offers the theory of "inherent energy" found in the high rate of velocity in the bullet at the moment of impact. He says "the soft parts themselves receive from the bullet a large amount of energy, and move outward in lines radiating from the long axis of a bullet track with such a degree of force that they act as secondary missiles on the neighboring tissues, and cause still further smashing and pulping of the tissues." The condition necessary, therefore, to produce explosive effects is great velocity in the bullet, and great resistance in the parts traversed by it. As before stated, the explosive range is about 350 yards. From this point the bullet traverses the middle zone and makes a clean-cut track until it loses much of its velocity and enters the ultimate zone where it may tilt or wobble and thus cause extensive laceration of tissue.

A matter of paramount interest to the surgeon is whether the projectile is purified by the act of firing. Longmore, after a full discussion sums up by saying: "Practical experience, indeed, contradicts the notion of the surfaces of a wound being scorched by heat whether the projectile has completely traversed the tissues concerned, or in its passage has been arrested in the flesh or by the opposition of a bone." Delorme also opposes the view that bullets can acquire such an amount of heat as would affect the tissues through which they pass or in which they lodge.

La Garde has shown that a bullet which is septic when fired will produce sepsis in the tissues which it traverses. He placed micro-organisms of anthrax on bullets and then fired them at susceptible animals. In every instance the animal succumbed, showing conclusively that there is no power of sterilization in the energized bullet. While the old lead bullet gathered its septic properties from the clothing which it carried into the wound track with it, the modern small-jacketed bullet seldom carries with it into the tissues shreds of clothing or infected substances. La Garde's experiments with powder demonstrate that while the old black powder was frequently the source of wound infection, the modern smokeless powder contains a substance which inhibits the growth of certain bacteria.

*The Wounds Caused by the Modern Small-arm Projectile.*—The three most striking features of these wounds are: (1) they are punctured wounds, not lacerated. This is explained by the small caliber of the projectile and its steel covering. (2) They are, as a rule, clean wounds, because of the infrequency of foreign bodies or infected material being carried along the track by the modern bullet. There being little devitalizing of tissue in the bullet track, and

the track being clean, there naturally follows the third feature, *viz.*, they heal rapidly. These characteristics are in strong contrast to the conditions imposed by the old lead bullet. The track through the soft parts was always much lacerated and confused, its diameter greater than that of the bullet. The tissues along the track were devitalized to a considerable extent. Shreds of clothing and other infected material were generally found within the track. The wounds always suppurred.

Let us examine in detail the wound inflicted by the modern small-arm bullet. The wound of entrance is circular with a hunched-out appearance, corresponding to the diameter of the projectile. The tissues of the bullet track are clean cut. The exit wound is a little larger than that of entrance (depending upon the velocity and the power of resistance of the tissues through which it has passed). It may be round, slit, T-shaped, or semicircular. The existence of a bone lesion may be diagnosed by the size of the exit wound. Von Coler, Delorme, and La Garde have shown that an exit wound, the diameter of an inch or more, is indicative of a comminuted fracture. In considering the effects of the bullet upon bone tissue we may safely postulate this rule: "The greater the resistance the greater the destructive effects produced by the passage of a bullet through animal tissue."

A great divergence of opinion exists among surgeons as to the amount of destruction caused by the modern projectile in the long bones. Referring to the rule that the destructive effects depend upon the resistance, we would expect greater destruction in compact bony tissue, less in cancellated tissue. The shafts must suffer most, the epiphyses less. The difference in effect is well illustrated in Cases XXX. and XXXVI. Both men received their wounds on the same firing-line. In Case XXXVI., the man was shot through the middle third of the femur. The bone was badly splintered, and longitudinal fissures extended for some distance along the bone. A subsequent amputation was necessary. In Case XXX., the man was shot through the condyles of the femur. A later operation to recover the bullet revealed a clean-cut tunnel through the bone about the size of a lead-pencil. The neighboring joint was not involved.

It would be fair to say that the splintering of bone decreases as the range increases, although Von Coler found that simple bullet-holes through compact bony tissue were never found even at extreme ranges. Primary hemorrhage as a cause of death on the battle-field is undoubtedly more common since the introduction of the modern small jacketed bullet.

The old lead bullet crushed and lacerated vessels.

Instances of extensive injuries are reported with little hemorrhage. The new bullet makes a clean cut in the vessel, and speedy death must ensue unless the nearest comrade can render instant and intelligent assistance. An instance was recited to the writer in which a captain was shot through the thigh, severing the femoral artery. A private, standing near, went to his assistance, and by the captain's direction compressed the artery for half an hour until the surgeon arrived. A few hours later the same private received a penetrating wound of the chest (*vide* Case VII.).

It has been an interesting query to obtain from the wounded their sensations upon receiving a bullet wound. The evidence submitted shows that the mental state at the time the injury was received has much influence upon it. In the heat of excitement there were many instances where men were not aware that they had been wounded. In a few instances the men had been conscious of a wound, but kept on fighting without inconvenience. As a rule, the pain is not severe when bone is not involved. A few instances will illustrate. One man shot in the foot was carrying a number of canteens to refill at a distant stream; when the wound was received he thought he had dropped one of the canteens upon his foot. Another, shot through the fleshy part of the leg, experienced a sudden stinging pain. Another, shot through the shaft of the femur, felt as if he had been hit with a sledge. Another, shot in the ilium, felt as if his whole side had been blown out. Others shot through the chest experienced a sensation like an electric shock or sudden numbness. In most instances there is great nervous depression out of all proportion to the gravity of the injury. The impression upon a man's mind which this class of injury makes must in large measure account for the susceptibility to shock.

Whether the modern bullet will become encapsulated and remain a harmless quantity in the tissues as readily as the old lead bullet must be determined by those who have a larger field for observation at their command. The only opportunity for observing this phenomenon was in two cases in both of which the bullet was found lying in a circumscribed area of pus.

The cases to be considered are fifty in number, and came under my observation in Brooklyn. While few incontrovertible deductions can be drawn from so limited a number, yet they are full of pertinent suggestions, and as such are offered as a small contribution to the study of this class of wounds. Every man on the firing-line was provided with a "first-aid package," which contained a compress of sterilized gauze, a triangular bandage, and safety-pins. This was the primary dressing applied in each case.

## WOUNDS OF THE HEAD.

**CASE I.**—Admitted to hospital fifteen days after injury. Bullet entered at the upper angle of the occipital bone on the left. It made its exit two inches above at the parietal eminence. The wound of exit was suppurating. There was complete paralysis of the right arm and slight paresis of the right leg. Patient left the hospital with nearly complete restoration of arm and leg function on September 7th.

**CASE II.**—Admitted to hospital fifteen days after injury was received. The bullet grazed the skull, causing a deep scalp wound over the left parietal region. The wound was suppurating when patient was admitted. Discharged cured.

## WOUNDS OF THE NECK.

**CASE III.**—Admitted to the hospital fifteen days after wound was received. Bullet entered one inch posterior to angle of the mouth on the left. It split the second molar tooth and part of the alveolar process, and was deflected to the posterior pharyngeal wall, and there lodged. On admission patient suffered severe neuralgia, radiating from the occiput down to both shoulders. He was unable to make the slightest movement of his head without intense pain. There was a slight swelling on the back of the neck over the fourth and fifth cervical vertebrae. There was limited motion of the jaw, a separation of about one inch. About a week later he expectorated a quantity of pus from the wound in the posterior pharyngeal wall. August 11th, several spiculae of bone were recovered from the pharyngeal sinus. The X-ray showed the bullet lodged alongside of the spine of the fourth and fifth vertebrae. Patient steadily improved, and was discharged August 27th with neck still stiff.

**CASE IV.**—Admitted to hospital fifteen days after injury was received. Bullet entered at outer margin of right trapezius muscle, two and one-half inches below mastoid process. Exit on left side of face, opposite second molar tooth. Wound healed *per primam*. There was a noticeable change in the voice sound. Voice steadily improved until time of discharge, September 7th.

**CASE V.**—Admitted to hospital fifteen days after being wounded. Bullet entered the under surface of the symphysis menti, and made its exit one inch to the right of the symphysis. Wound was suppurating. During convalescence patient suffered from neuralgia of the inferior dental nerve. Discharged cured.

## WOUNDS OF THE CHEST.

**CASE VI.**—This is reported by Dr. Senn in the *Medical Record* of July 30th, as follows: "Edward O'Flaherty, Company C, 16th Infantry. Was wounded July 2d by a ball, forty-five caliber, from a bursting shrapnell. The projectile entered below the angle of the right scapula. Passed through the lung, diaphragm, liver, and lodged beneath the skin in front, between the seventh and eighth ribs. Bloody expectoration for some time, and slight elevation of temperature. July 12th, temperature nor-

mal. July 21st, patient suffers but little inconvenience from his wounds. No peritoneal or pleural effusion. General condition promises an early and complete recovery." Admitted to hospital July 27th. Wound was entirely healed. No pulmonary symptoms. Discharged cured.

**CASE VII.**—This case is reported by Dr. Senn in the *Medical Record*, July 30th, as follows: "John B. Senica, Company G, 22d Infantry, was wounded July 21st, by a bullet which entered his back just below the angle of the left scapula, passed upward through the lung, neck, and jaw, and emerged through the alveolar process of the right bicuspid tooth, cutting the tongue slightly. All the wounds healed in a short time by primary intention. Hemoptysis profuse immediately after he was shot, and slight for the following few days. Left arm at first nearly powerless, with desquamation of the skin of the hand. Function of the arm returning gradually. In three weeks the patient was able to sit up for a short time each day. Physical examination of the chest at this time revealed nothing abnormal."

Admitted to hospital July 27th. Wounds were entirely healed. Physical examination showed complete flatness over the left side at the base; there was some dyspnea. Temperature ranged from 100° to 102° F. August 2d, thoracocentesis performed. Result *nil*. Patient continued to grow worse. August 23d, operation—two inches of the seventh rib was removed, and about eight ounces of pus and a large quantity of disintegrated tissue and clot removed. Patient has steadily improved. There is still loss of power in the left arm. Little improvement can be noted.

**CASE VIII.**—This case is reported by Dr. Senn in the *Medical Record* of July 30th, as follows: "William A. Cooper, Company A, Twelfth Cavalry, was wounded July 1st. The bullet entered an inch below the left nipple and escaped from the body an inch below the costal arch in the mammary line. It is questionable whether the bullet opened either the pleural or peritoneal cavity as the injury was not followed by any symptoms referable to visceral wounds in either the chest or abdomen, although the course of the bullet was such as to give rise to the suspicion that either or both of these cavities might have been invaded." Admitted to hospital July 27th. It was found that the ball had also entered the thigh at its middle third on the inner surface and lodged in the lower third on the outer surface. It could be felt beneath the skin in the position described. July 27th, bullet was removed. Patient made a rapid recovery. It is believed that the bullet did enter the lung as a history from the patient elicited the fact that he did suffer from some dyspnea immediately after being wounded and expectorated some blood.

**CASE IX.**—This case was reported by Dr. Senn in the *Medical Record* of July 30th, as follows: "Henry Mitchell, Company C, Seventh Infantry was wounded July 1st. The bullet entered over the right acromion process, passed through the apices of both lungs, and escaped through the second inter-

costal space above the right nipple. No hemoptysis at any time; dry cough, and a moderate hemothorax on the right side. Has suffered from quotidian form of malarial fever which is yielding to quinin. A speedy and complete recovery is expected." Admitted to Long Island College Hospital July 27th. Wounds were healed. No pulmonary symptoms. Patient has had some elevation of temperature which readily yielded to quinin, and was subsequently discharged cured.

CASE X.—Admitted to hospital twenty-three days after injury was received. Bullet entered the flexor surface of the left forearm and emerged through the skin and entered the outer surface of the arm and escaped at the inner surface. Entered the chest below the axilla, and lodged beneath the eighth rib near its vertebral attachment. In its course it produced a compound comminuted fracture of the humerus at the middle third; a penetrating wound of the lung and a fracture of the eighth rib at its angle. On admission temperature ranged from  $100^{\circ}$  to  $103^{\circ}$  F. There was marked dyspnea, a dry cough, and dulness over the left chest. The bullet could be felt beneath the fragments of the rib. Patient's pulmonary symptoms grew worse. July 19th, thoracocentesis performed. One pint of serosanguineous fluid was removed. July 22d, bullet without its jacket was removed, and two pints of purulent fluid and necrotic tissue were removed. After operation patient improved, but a large quantity of pus and débris was discharged, and it was decided to enlarge the opening for freer drainage. August 10th, part of one rib was removed, and a large quantity of necrotic tissue and disintegrated clot curetted away. The jacket of the bullet was recovered at this time. Patient is steadily improving.

CASE XI.—Admitted to hospital fifteen days after being wounded. Bullet entered on left side of neck one-half inch from the median line opposite thyroid cartilage. Exit on right side of chest at the fifth rib opposite the posterior axillary line. It fractured the clavicle at the inner third, injuring the second part of the subclavian artery and producing an aneurism which afterward proved to be arteriovenous in character. The fragments of clavicle were separated about one-half inch, beneath which could be felt a pulsating tumor giving a distinct bruit. Wounds healed *per primam*. No pulmonary symptoms present.

CASE XII.—Admitted to hospital fifteen days after the wound was received. Bullet entered second interspace one inch to right of sternum and made its exit just below spine of scapula. Patient suffered some from dyspnea and hemoptosis. Wounds healed *per primam*. Patient made a complete recovery.

CASE XIII.—Admitted to hospital fifteen days after being wounded. Bullet entered the second interspace to the right of sternum and made its exit just below the spine of the scapula on the same side. Wounds healed *per primam*. No further symptoms.

CASE XIV.—Admitted to hospital twenty-five days after injury was received. Bullet entered on left side at about the fifth rib in the axillary line

and emerged on the right between the seventh and eighth rib to the outer side of mammary line. Both wounds of entrance and exit healed. Two days before admission patient fell and struck the wound of exit over the edge of a bath-tub. There resulted a swelling and subsequent rupture leaving a fistula discharging bile and mucus. Patient a few days later removed to hospital on Governor's Island.

CASE XV.—Admitted to hospital fifteen days after wound was received. Inspection showed a wound of entrance on the left side at the eighth rib in the posterior axillary line. No wound of exit. Patient complained of pain in the hip-joint, and there was anesthesia of the right lower extremity. The X-ray gave no result. August 27th, patient still complained of pain and the anesthesia had not subsided when discharged.

CASE XVI.—Admitted to hospital fifteen days after wound was received. Inspection showed a wound of entrance at the sixth interspace behind the axillary line and a wound of exit in the corresponding space on the opposite side. Patient suffered some from dyspnea and hemoptysis. July 20th, discharged with slight cough and dyspnea.

Out of the eleven cases of penetrating wounds of the lung, only two were infected, leaving eighty-two per cent. clean wounds. The symptoms in the non-infected cases were slight dyspnea and hemoptysis which passed away in a few days. In the two infected cases the symptoms were of slow onset and culminated in operation at the end of four and seven weeks, respectively.

#### WOUNDS OF THE EXTREMITIES.

CASE XVII.—Admitted to hospital twenty-five days after injury was received. Bullet entered outer side of arm three inches below the acromion and was removed at the field hospital from the left side of the neck at the outer edge of the sternomastoid muscle. Exit wound was suppurating.

CASE XVIII.—Admitted to hospital fifteen days after being wounded. Bullet entered one and a half inches below apex of shoulder. No wound of exit. Wound healed *per primam*. X-ray gave no results.

CASE XIX.—Admitted to hospital twenty-five days after being wounded. Bullet entered two and a half inches below the acromion on the outer surface of the right arm and lodged. Wound was clean. The X-ray showed the bullet lodged just below the clavicle at the middle third. Presence of the bullet gave no symptom and was left *in situ*.

CASE XX.—Admitted to hospital fifteen days after being wounded. Bullet grazed the olecranon process leaving a granulating wound of about two and a half inches. Patient said that small portions of olecranon were removed at the field hospital.

CASE XXI.—Admitted to hospital fifteen days after being wounded. Inspection showed a bullet wound of entrance at the fold of the elbow and a wound of exit on the inner side about one and a half inches above the condyle. The bullet severed the brachial artery. It was ligated at its middle third at the field hospital. On admission, wound of exit

was healed. Wound of entrance suppurated. Six days after admission an incision was made over the flexor surface of the forearm from the elbow to the wrist. The sloughing flexor muscles and tendons were cut away. The arm healed, but the hand has little function.

CASE XXII.—Admitted to hospital fifteen days after being wounded. Bullet passed through the fleshy part of the forearm. Wound of exit was found suppurating.

CASE XXIII.—Admitted to hospital fifteen days after being wounded. Bullet passed through the fleshy part of the right hand. Wound was suppurating. There was complete recovery of hand function.

CASE XXIV.—Admitted to hospital fifteen days after wound was received. Inspection showed a bullet wound of the hand causing a compound fracture of the third metacarpal bone. Wounds were suppurating. Patient recovered with a stiff finger.

CASE XXV.—Admitted to hospital fifteen days after being wounded. Bullet entered two inches below the crest of the ilium on the right side and was found by the X-ray lodged on the inner side of the thigh at the middle third over the femoral line. Bullet could not be found at operation. Patient made a complete recovery.

CASE XXVI.—Admitted to hospital fifteen days after being wounded. Bullet entered one inch below the crest of the ilium on the right side, and came out of the buttock just above the anal cleft. It re-entered the left buttock and made its exit just above the gluteal fold. Wounds of exit suppurating.

CASE XXVII.—Admitted to hospital fifteen days after being wounded. Bullet entered one inch below the anterior superior spinous process on the left and made its exit through the left buttock. Wound of exit suppurating. Patient complained of neuralgic pains in front of thigh and leg. Pain subsiding at time of discharge.

CASE XXVIII.—Admitted to hospital fifteen days after being wounded. Inspection showed that the bullet had passed through condylar extremity of the femur. Entered the upper portion of the calf of leg and made its exit three inches below. The wound suggests the posture of the soldier when injured. There was no joint injury. Some suppuration from the wound of calf. Recovery complete.

CASE XXIX.—Admitted to hospital twenty-five days after being wounded. Bullet entered the outer surface of the thigh at the middle third and lodged. On admission there was found a fracture of the femur at the middle third and a suppurating sinus leading down to the seat of fracture. July 28th, the opening was enlarged and several fragments of bone, together with the bullet removed. Patient is convalescing and the union is firm.

CASE XXX.—Admitted to hospital twenty-two days after being wounded. Bullet entered the thigh at the lower third. Passed through the femur and lodged behind the internal tuberosity of tibia as shown by the X-ray. At operation the bullet was recovered and there was a hole tunneled through

the femur about the diameter of a pencil. Patient made an excellent recovery.

CASE XXXI.—Admitted to hospital twenty-five days after being wounded. Bullet entered three inches below the crest of ilium on the left and outer surface of thigh, and came out just below Poupart's ligament on the inner surface. It passed over and injured the foreskin, making a circumcision necessary. Exit wound suppurating.

CASE XXXII.—Admitted to hospital twenty-three days after being wounded. Bullet entered the soft tissues of thigh two inches above the condyle of the femur. Bullet was found by the X-ray lodged in the tissues two and one-half inches above the external condyle. The bullet was removed and a circumscribed area of pus found surrounding it.

CASE XXXIII.—Admitted twenty-five days after being wounded. Bullet entered the upper third of the right thigh on the outer side, and came out at the lower half of the thigh on the inner side. Wound of exit suppurating.

CASE XXXIV.—Admitted to hospital fifteen days after being wounded. Inspection showed a bullet wound in the fleshy part of the right thigh. Wound healed *per primam*.

CASE XXXV.—Admitted to hospital fifteen days after wound was received. Bullet wound of the soft parts of thigh at the middle third. Exit wound was suppurating.

CASE XXXVI.—Admitted to hospital twenty-three days after being wounded. There was a bullet wound of entrance on the outer surface of the thigh at the middle third. No wound of exit. There was a fracture of the femur and a sinus leading down to the bone ends, from which exuded large quantities of pus. August 2d, an incision was made over the sinus track, and a number of small fragments of bone and a flattened piece of lead removed. Thorough drainage was established and the limb immobilized. August 9th, the patient showed signs of general septic invasion, and amputation of the thigh at the middle third was performed. Patient is making an excellent recovery. The Mauser bullet was found in the amputated limb just behind the head of the tibia in a half an ounce of pus. Its shape was fairly well preserved. The bone was badly comminuted, and there were a number of longitudinal fissures.

CASE XXXVII.—Admitted to hospital twenty-five days after being wounded. Bullet passed through the fleshy part of thigh just above the knee. Wounds healed *per primam*.

CASE XXXVIII.—Admitted to hospital fifteen days after being wounded. Bullet passed through the soft tissues just above the knee. Wound healed *per primam*.

CASE XXXIX.—Admitted to hospital fifteen days after being wounded. There was a bullet wound of the fleshy part of the leg near the ankle. The entrance wound had healed *per primam*, leaving a small area of granulating surface at the exit wound.

CASE XL.—Admitted to hospital fifteen days after being wounded. Bullet entered at the lower

angle of popliteal space, and passed obliquely downward four inches, emerging at the inner side of calf. Wound healed *per primam*.

CASE LXI.—Admitted to hospital twenty-two days after being wounded. Bullet passed through the lower third of tibia, producing a compound comminuted fracture. July 28th, wound was enlarged, fragments of bone removed, and through-and-through drainage established. No communication with the ankle-joint. Patient has firm union, and wound is rapidly healing.

CASE XLII.—Admitted to hospital twenty-two days after being wounded. Bullet entered the leg at the middle third. Was deflected by the tibia, and came out three inches below. Wound healed by first intention.

CASE XLIII.—Admitted to hospital twenty-five days after being wounded. Bullet entered the outer side of the calf, and emerged three inches below. Exit wound was suppurating.

CASE XLIV.—Admitted to hospital twenty-five days after being wounded. The bullet glanced across the crest of the tibia of the left leg, causing a compound fracture of that bone. Wound suppurating. Patient is making a rapid recovery.

CASE XLV.—Admitted to hospital fifteen days after wound was received. Bullet wound through the soft tissues of the left leg. Wound healed by first intention.

CASE XLVI.—Admitted to hospital fifteen days after injury was received. Inspection showed a bullet wound through the fleshy part of the leg near the ankle. Healing *per primam*.

CASE XLVII.—Admitted to hospital fifteen days after being wounded. Inspection showed a bullet wound of the ankle-joint. The bullet had evidently passed through both malleoli. Wound healed *per primam*. Function of joint perfect.

CASE XLVIII.—Admitted to hospital fifteen days after injury was received. Inspection showed a bullet wound passing through the third metatarsal space and perforating the sole. Suppurating wound of exit.

CASE XLIX.—Admitted to hospital fifteen days after being wounded. Inspection showed a bullet wound of the foot in the metatarsal region. Slight suppuration at the wound of exit.

CASE L.—Admitted to hospital fifteen days after wound was received. Inspection showed a bullet wound of the foot through the second metatarsal space. Wound healed by first intention.

Of these 34 cases, 15 were clean, 19 infected. Dr. Senn believes that many wounds of the extremities were infected because of the unnecessary change of dressings due to a natural desire of the men for treatment and the indulgence of the surgeons. Of the 19 infected wounds 11 were infected at the wound of exit, due in part, perhaps, to the extensive laceration and the devitalization of tissue at this point. Five were compound fractures, 2 were infected wound tracks, the tracks being short, the infection un-

doubtedly an ascending one, starting from the wound of exit, and 1 was an encapsulated bullet. There is no doubt that the majority of infected wounds were the result of unnecessary handling and the disturbance of the primary dressing.

#### CONCLUSIONS.

From a study of the cases reported we may conclude that all wounds inflicted by the modern small-arm projectile require immediate protection from bacterial invasion by the application of suitable dressings; that the great majority of these wounds require this and nothing more. It would almost be inferred that the inventor of the modern bullet was possessed of surgical instincts, so harmoniously does it work in accord with modern surgical technic. In the mid-range at least we may say that it incises without devitalizing; it penetrates without infecting. Modern bullet wounds are clean wounds. Their treatment consists in keeping them clean.

While the damage to the shaft of the long bones must always be considerable, the ends of the long bones suffer less; joint complications are few and amputations rare. Few bullets will be found lodged in the body because of the great velocity and penetrating power of the steel-jacketed projectile. The value of the X-ray in this class of injuries is simply inestimable. The probe with all its attending disadvantages has been relegated to a minor sphere of usefulness. The sense of sight has superseded the sense of touch, and surgical practice has advanced another step toward the ideal by Roentgen's great achievement.

Since primary hemorrhage must be the cause of many deaths on the battle-field, it is imperative that every soldier in our army and National Guard should receive instruction in the location of important arteries and the ordinary means of hemostasis. In such an emergency many lives could be saved by the intelligent efforts of a comrade. We might, too, with advantage, teach the value of the first-aid dressing and its proper method of application. The maxim of Nussbaum cannot be too strongly emphasized: "The fate of a patient seriously wounded is almost entirely in the hands of the surgeon who applies the first dressing."

I wish to acknowledge my obligations to Dr. H. B. Delatour for the use of this material, in whose service the patients were treated.

*Death of Mrs. Fordyce Barker.*—Mrs. Barker was so intimately associated with her husband, the late Dr. Fordyce Barker of New York, not only in his social but also his professional career that it seems fitting to record in our columns the fact that she died at Norwich, Conn., October 28, 1898.

ATONY OF THE STOMACH.<sup>1</sup>

BY A. J. PATEK, M.D.,  
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ATONY of the stomach is a common affection, yet a condition which—not recognized as a distinct disease requiring definite measures for relief—gradually passes into a stage in which treatment is of little avail. Because of its practical importance, then, I wish to say some words concerning this affection, its cause, symptoms, diagnosis, and treatment, and to cite a few illustrative cases.

The name "atony," though commonly used to designate this condition is, correctly speaking, rather inaccurate, since it means "an absence of tone." This affection is, however, decidedly not of this character, and is better designated by the terms "hypotonia" (Bouveret) and "myesthesia gastrica" (Boas). Boas makes use of a classification of gastric motor disturbances that has met with favor by many; he speaks of mechanical insufficiency of the first and second degree, the first degree being so-called "atony," the second, "gastrectasia." By atony—to adopt the popular term—we mean a condition of diminished motile power of the stomach, resulting in an inability on the part of this organ to rid itself of its contents in a normal period of time. We may further speak of primary and secondary forms of atony, and this brings us to a consideration of the conditions under which it exists, and its causes.

Boas has observed primary gastric myesthesia occurring as a congenital or hereditary defect, and even finds it running in families, though Ewald doubts the frequency of primary atony, that is, a muscle hypotonicity pure and simple, and sees in this condition a strong neurotic element, leaning to its classification among the neuroses. Among the forces at play in bringing about an atony secondarily, we may state that general diseases, fevers, anemias, etc., that leave the system in an asthenic condition, often exert a similar influence upon the stomach-walls, reducing their tone likewise. Excessive eating and drinking, by the constant strain put upon the stomach-walls, may cause a dilatation and atony, though, as Pepper and Stengel<sup>2</sup> point out, dyspeptic symptoms are present also, and it is quite possible that the primary cause of atonic dilatation is some other gastric glandular disturbance. Atony may associate itself with any, and does associate itself with many forms of gastric disturbance, and thus it becomes a difficult matter to say which of these was the primary condition, and we find ourselves dealing with a vicious circle of circumstances. A primary gastric myesthesia soon has added to it

disturbances of the gastric glandular functions, and *vice versa*, many pathological gastric conditions give rise to the complication, atony.

Indiscretions in diet, and, as already said, excessive eating, more particularly the inordinate use of liquids, such as alcohol, coffee, tea, soup, and the long-continued use of cathartic waters, etc., are the most common direct causes of this form of gastric trouble. There are also other and graver causes, such as internal and external obstructions to the expulsion of the stomach-contents, or gastric ulcer and carcinoma leading to secondary muscular changes, and these conditions frequently pass on to mechanical insufficiency of the second degree (Boas)—gastrectasia.

Among the more prominent subjective symptoms, we may briefly mention the following: a feeling of decided fulness after eating, and satiety before the full meal is taken, gastric distress of variable duration, eructations, dizziness, and constipation. The ingestion of fluids is especially prone to cause a sensation of weight. Neuroasthenia, with all its pronounced and peculiar manifestations, is a condition frequently complicating long-standing atony, and with it obstinate constipation and fermentation are also troublesome complications.

The objective symptoms are of a more distinctive character, and call for an examination of the stomach with reference to its size, its power of expulsion and tonicity, and in a minor degree, the chemistry of its secretions.

Though atonic stomachs are not always dilated, this is so generally the case as to almost make it a rule. On the other hand, a large stomach is not always atonic, for it may have normal power of expulsion, a condition not frequently met with, and known as megalogastria. (Ewald.)

Normally the lower border of the stomach extends to a point about  $1\frac{1}{4}$  to  $2\frac{1}{2}$  inches above the umbilicus, and an organ whose large curvature is found at or below the umbilicus may be considered to have abnormal dimensions, providing the condition be not one of a displaced organ—a gastrophtosis.

The elicitation of the splashing sound ("clapotement" of the French) and the percussion of the stomach are among the important methods of physical examination. The splashing sound is elicited by a succession of quick shocks over the stomach-area with the tips of the fingers, and when present upon the taking of a small quantity of fluid, one cup, or several hours after a light meal, a myesthetic state may be inferred. An error may creep in if the contents of the colon are liquid; in such case the bowel should either be evacuated or a re-exam-

<sup>1</sup> Read before the Wisconsin State Medical Society.

<sup>2</sup> American Journal of the Medical Sciences, January, 1897.

ination made when the feces are of normal consistency.

Percussion, unless the stomach be artificially distended with fluid or gas, is, as a rule, quite unsatisfactory, though Pepper and Stengel (*loc. cit.*) seem to be well pleased with the results they obtained with auscultatory percussion. I have tried this method in a few cases, with fairly satisfactory results; it is surely far superior to the ordinary method of percussion.

Artificial distention is most easily brought about by administering a Seidlitz powder, drinking the two portions separately, so that the evolution of gas takes place in the stomach, or better—and fraught with less danger—by pumping air into the stomach with an ordinary bulb-syringe through a previously passed tube. Electric illumination of the stomach (*gastrodiaphanoscopy*) is also used, but has found few enthusiastic supporters. Dehio's method, that of having the patient drink two or three tumblerfuls of water while standing, and then determining the lower border by percussion, is quite satisfactory. The Röntgen-ray gives promise of becoming a very useful adjunct to the methods of diagnostically the position and contour as well as abnormalities of the stomach and intestines. Boas and Levy-Dorn<sup>1</sup> use for this purpose large-sized celluloid-coated gelatin capsules filled with metallic bismuth. This capsule is swallowed, and since it permits but few rays to pass through, and hence throws a satisfactory shadow, can be followed in its passage from stomach to bowel until it leaves the system, and its position noted at various periods. The results thus far obtained have, according to the authors, been very encouraging.

Various tests of motor-function are made use of—the best being Leube's test-meal, consisting of a plate of soup, a piece of steak, a slice of bread, and a glass of water. Seven hours after its ingestion this must normally have passed out of the stomach. If, upon examination with the stomach-tube, solid particles are found remaining, a motor weakness may be argued.

Ewald's salol test has been found sadly deficient by many observers, but instead of examining the urine to record the time that elapses before the salol begins to be excreted, Huber has suggested a modification, testing for the length of time during which excretion takes place. He claimed that a normal condition existed if the urine reaction (purplish precipitate upon the addition of ferric-chlorid solution) disappeared after twenty-seven hours, and that a delay in the expulsion of the stomach's contents could be argued if the reaction continued many hours after.

The reliability of this is adhered to by a few, but fought by many.

The chemical examination of the stomach-contents shows, in an uncomplicated case, nothing distinctive. The acidity may be subnormal, but more frequently there is a normal or hyperacid condition.

The diagnosis of gastric atony is not difficult if the various subjective, and, more especially, the objective, signs as detailed, are elicited. In the differential diagnosis gastrectasia and gastrophtosis must be considered. As symptoms of gastrectasia we may mention: excessive dilatation, habitual vomiting of enormous quantities—frequently containing remains of a previous day's meal, and this in a state of much fermentation, hyperacidity, and usually *sarcinæ* and yeast fungi; morning lavage reveals remains of the previous evening's meal, a condition never found in atony; the general health of a gastrectatic patient is very bad, and emaciation is often quite extreme.

Gastrophtosis, a sinking of the whole stomach, is usually associated with a certain degree of enteroptosis. There are frequent attacks of severe pain after meals, and marked constipation. Examination reveals the following: considerable emaciation, distention in umbilical region and relative flattening in epigastrium, succussion-splash demonstrable at some distance, splashing sound elicited over a vertical area of six inches (two above and four below umbilicus), covering the visible distention, and making it possible to definitely outline the large and small curvatures without artificial distention. In addition, there are evidences of the retention of food in the stomach for longer than normal periods. In this case we must diagnosticate dilatation in addition to dislocation of the organ.

In place of detailing the treatment prescribed for the average patient, I shall dwell on two illustrative cases of atony, one of very mild character, the other of very severe type, and the treatment of these patients may be taken as that quite generally applicable to all this class of cases:

CASE I.—E. K., aged twenty-two years; office clerk; leads a very sedentary life. Complaint of gastric distress is of three-months' standing. Acidity and fulness are experienced after eating, and there is considerable gaseous distention and constipation. There is no vomiting. Four hours after eating a light meal splashing could be elicited in the epigastrium, its lower limit being 5 cm. ( $1\frac{1}{2}$  inches) above the umbilicus.

Auscultatory percussion of the stomach covered this area quite accurately. The patient refused to have a stomach-tube passed, so no direct examination of gastric contents could be made. However, from the data given, I felt justified in making the diagnosis: atony of mild degree, without dilatation. He

<sup>1</sup>Deut. Med. Woch., No. 2, 1898.

was advised to take as much exercise as possible. In addition he was given a cascara laxative and told to make frequent flexion-movements of the thigh on the abdomen while lying in bed—these movements acting as a massage, strengthening the abdominal muscles. For direct tonic and stimulant action nux vomica was given in pill form, combined with soda bicarbonate. Four weeks later he reported himself well, and physical examination elicited nothing abnormal.

This, it is true, was a mild case, but the tendency of the disease is to progress, and the earlier the proper treatment is instituted the more satisfactory are the results for both physician and patient.

I wish now to detail another case of atony, but one of very different character, since it shows us the disease in a very advanced stage, bordering on gasterctasia, and illustrates the symptoms, diagnostic points, and treatment in an instructive and satisfactory manner.

**CASE II.**—Male, aged twenty-eight; bookkeeper by occupation; has been complaining of gastric discomfort for about ten years. His habits have been fair; alcohol and tobacco are used moderately; when careful with diet feels more comfortable, but frequently indulges in heavy and rich meals. Complaint now is of gastric uneasiness and a feeling of weight and fulness of several hours' duration after eating. Does not vomit. Fluids especially occasion distress. Several times, after midnight suppers, he has had to remove contents of stomach on the following morning by means of the stomach-tube, such was the uneasiness felt. He has come to me on several occasions, an hour or two after eating, to have his stomach washed out and relieved of its distress-giving contents.

Ordinarily no residue of the evening meal is ever found in the stomach on the following day, and this fact was thoroughly tested. Gas eructations are frequent; appetite good; there is but little epigastric pain or sensitiveness to pressure. During the past few years he has had various neurasthenic symptoms: giddiness, drowsiness, lack of energy and concentration of thought. The bowels are markedly sluggish, in fact, there has not been an unaided movement for several years. Occasionally great abdominal distention occurs several hours after eating, and this accumulation of gas causes great discomfort.

Examination reveals the presence of the splashing phenomenon four hours after a very light lunch, and after two tumblersfuls of water are taken it can be easily elicited as low as the umbilicus. I did not artificially distend the stomach but light percussion seemed to bring its lower border about one inch below the umbilicus. Upon the results of the salol test alone I should not base positive conclusions, but with other symptoms pointing to a dilatation and motor-insufficiency, I think it significant that the excretion of the salol in the urine began long after what has been considered the normal period, and con-

tinued, instead of about twenty-seven hours, more than forty hours after its ingestion. The stomach contents when removed one hour after a Boas-test breakfast, consisting of a roll and a large glass of water, showed but little undigested matter, slight fermentation; the total acidity varied at different times between 0.10 per cent. and 0.27 per cent. (normal 0.15-0.20 per cent.); free HCl. was always present, lactic acid absent. Unfortunately a Leube test-meal was not taken at this time, but I considered the other signs sufficient to warrant the diagnosis of gastric atony, without passing the tube for another examination. Abdominal massage, galvanization, and faradization, both intra- and extra-gastrically, properly regulated diet, strychnin with soda, salol, laxatives, etc., constituted the general treatment. Four months later the Leube test-meal was given and the stomach was found to have completely emptied itself in the normal period of time—seven hours. Moreover, the splashing phenomenon was practically absent; the lower border of the stomach descended but little beyond the normal, and the salol test, taken for what it is worth, exhibited a positive reaction at what is considered the normal period—sixty minutes after its ingestion, and disappeared altogether after a lapse of twenty-seven hours. The intestinal atony that also exists, still gives considerable annoyance.

As to the treatment of gastric atony the following general directions may be given: All discoverable causes, such as anemia, condition of exhaustion, etc., should be attended to and rectified as far as possible; the excessive use of alcohol and other liquids must be stopped; the diet must be properly regulated: it should consist of easily digested foods, and better than three full-sized meals per day are five meals, each of smaller quantity and taken at shorter intervals. The gastric contents should be tested occasionally, if the acidity is above normal, meat diet is more easily digested; if subnormal, a lighter diet, consisting of light meats, vegetables, etc., is indicated; liquids are to be used in small quantities; fresh fruits frequently set up fermentation, stewed fruits on the other hand, being usually well borne. A general tonic treatment is to be highly recommended; deep massage of the abdominal walls, calisthenics, hydrotherapy, electricity, both faradic and galvanic, and applied externally as well as intraventricularly. Of various drugs that may be used, strychnin is the best and with it may be combined a laxative, soda bicarbonate if necessary, salol, or salicylic acid, if there is much fermentation, etc. The constipation must be combatted with suitable diet and an occasional laxative. Drastics should be avoided. Systematic lavage of the stomach is uncalled for, since in atonic conditions no residual food is found in the stomach in the morning, and therefore, lavage accomplishes no purpose.

To summarize then, we record as subjective symp-

toms of gastric atony: Fulness, weight, and distress after eating, early satiety, eructations, nervous symptoms, and constipation. Objective signs: Atonic dilatation and deficient motor power. Treatment: Dietetic, general, and tonic.

**CARBONIC-ACID GAS; ITS PHYSIOLOGICAL ACTION AND THERAPEUTIC EFFECT,  
AS SEEN IN EMPHYSEMA OF THE LUNGS, ANEMIA, WHOOPING-COUGH, DYSENTERY, AND IMPOTENCE.**

By A. ROSE, M.D.,  
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(Continued from page 548.)

3. *Carbonic-Acid Gas as a Therapeutic Agent in Chlorosis, Asthma, and Emphysema of the Lungs.*—The physicians of olden times were aware of the anesthetizing qualities of carbonic-acid gas. Local application of carbonic-acid gas was still a favored remedy of English physicians of the Eighteenth Century. In the year 1832 Professor Mojon of Genoa recommended carbonic-acid gas douches against dysmenorrhea, a treatment which had been known and had been forgotten again. Brown-Séquard demonstrated the anesthetizing effect of the gas on the larynx. In former times carbonic-acid gas inhalations of a specified degree were a well-known, extensively employed therapeutic measure. From the observation that the fumes of freshly plowed earth did good service to consumptives, or at least seemed to do, the conclusion was arrived at that the carbonic acid of these fumes was the essential agent. From the reports on the curative effect it can be inferred that the relief obtained was due to the narcotic action of the gas. The application of carbonic-acid gas in this form was abandoned. An unintentional admission of carbonic-acid gas by way of respiration takes place sometimes during bathing of patients in carbonic-acid baths. There are cases on record in which the gas escaping from the bath has brought on more or less severe intoxications. Ordinary precautions have to be observed. However, the direct poisonous effects of carbonic-acid gas have been exaggerated, for it has been found that air containing from fifteen to twenty per cent. of this gas can be breathed without producing any immediate evil effect, providing the quantity of oxygen in the air be increased in a like proportion. Intravenous injections of carbonic-acid gas which have been carried out repeatedly on animals are not qualified to be considered for methodical application as a therapeutic measure.

The physicians of Nauheim were the first who gave a scientific description of the influence of car-

bonic-acid water-baths in different nosological conditions, especially in disorders of circulation. Great praise is due to Beneke, the first who demonstrated that the water-bath saturated with carbonic-acid gas is a powerful and effective stimulant for the enfeebled heart. He was the first who had the courage to place dyspneic patients suffering from uncompensated valvular disease into the bath. His beginning was rewarded by most significant success. He also tried the effect of the baths in other nosological conditions, in arthritis and nervous diseases. Schott and Groedl continued to work on the basis which had been laid down by Beneke, and their success is universally known. The brothers Schott have established a system of their own of physical therapeutics of disorders of circulation in which carbonic acid plays a rôle. A number of contrivances have been recommended to give artificial carbonic-acid baths as substitutes for the natural ones of Nauheim, among them those of Ewald, of Rudinger, and of Körting.

The induction of carbonic acid into the circulation by way of the rectum is an idea of recent date, at least we find in older literature only a few notes here and there according to which this form of application has been thought of. Bergeon, in the year 1886, published his new method of treatment of phthisis, based on the fact established by Claude Bernard, that volatiles introduced into the rectum will pass through the venous blood-current to the lungs where they will be eliminated without entering into the arterial system or developing any deleterious effect. Bergeon calculated by means of enemas of sulphuretted hydrogen diluted with carbonic-acid gas to destroy the tubercle bacilli within the lung tissue. In the course of events his method soon became widely known and was extensively practised in France and in America. In Germany almost no notice was taken of it. Among the eighty publications on this method collected by Wesener, only three are of German origin. The great majority of authors confirmed the observation that the general condition of the patients treated was improved, but they soon found that the tubercle bacilli did not disappear, and that not the sulphuretted hydrogen but the carbonic acid was the effective agent; whatever benefit was derived was due to the carbonic acid solely. Although some of the most distressing symptoms of phthisis were at once relieved, namely, the general condition, the cough, the expectoration, the night-sweats, the fever, and especially the dyspneic difficulties and the feeling of oppression, the method was abandoned because it did not answer the main expectation; it did not cure tuberculosis. Having thus been dis-

appointed, nobody for a while grasped the idea of making use of the undisputable healing power of the gas in other but tuberculous affections of the lungs. Physiological and pharmacological interests should have induced consideration.

The large amount of carbonic-acid gas having been induced into the rectum passes through the veins, enters into the alveoli and from there, obeying the physical law, is diffused in an upward direction, and thereby an access over the normal process of the diffusion of the gases takes place, that is, more than the normal amount of carbonic-acid gas ascends, and more than the normal amount of oxygen descends, the ventilation of the air-passages thus being increased.

Increased ventilation of the lungs brought on by increased respiratory activity, that is more profound inspirations, causes a larger amount of oxygen to be retained in the body, but only a small part of this extra amount of oxygen enters the blood; by far the greater part enters into the composition of the residual air, enriching it with oxygen. With the increased activity of the respiratory organs the body uses up a larger amount of oxygen than normally, and the small extra amount in the residual air is needed to cover the deficit, and there is not enough left to add noticeably to the oxygen of the blood. Increased ventilation of the lungs brought on by increased diffusion as a consequence of carbonic-acid inflation of the rectum is in all probability followed by increased accumulation of oxygen in the blood. This is the main factor of the curative effects which thus far have been observed.

Ephraim administered carbonic-acid gas per rectum to a number of out-door patients. He gave, as a rule, one, and only in exceptional cases two sittings a day. Liquefied gas in the manner described was employed. The patients treated were suffering from chlorosis, phthisis, and asthma. Of chlorosis he had eleven cases (girls of the age of from sixteen to twenty-two years). The circumstances surrounding them were most unfavorable in regard to health. All these patients belonged to the poorer classes; they were obliged to earn their living by working in factories. Their fare was correspondingly a very poor one. In order to secure the results of the carbonic-acid treatment pure and simple, nothing was changed in regard to occupation and mode of living of these patients while under treatment. The cases selected were all of a severe form of chlorosis, and except in one instance they all were of long standing and had been under treatment. One of these patients was not benefited by the carbonic-acid gas; in two cases there was marked improvement, and in seven complete cure. The examination of the blood was made

in nine out of the eleven cases, and was confined to the number of red blood-corpuscles. An unmistakable, and in most instances a considerably increased, number of red blood-corpuscles was noted. Although there was no examination made in regard to the amount of hemoglobin, Ephraim thinks that there must have been, judging from the improved general condition of the patients, an improvement in this direction. It may safely be said that Ephraim's experience shows that carbonic-acid-gas treatment is an excellent auxiliary in the treatment of chlorosis. The result of the examinations of the blood support the theory that the healing effect is due to an increased induction of oxygen into the blood. For asthma he treated 20 patients, 10 of whom were suffering from true bronchial asthma, 5 from neurasthenic asthma, 3 from emphysema of the lungs associated with bronchitis and asthmatic attacks, the nature of which could not be exactly defined. All the ten patients suffering from bronchial asthma were relieved from these difficulties for shorter or longer periods of time. This result was a surprise, considering that the affection is, as a rule, unyielding to all sorts of treatment. In these cases the effect of the carbonic-acid gas made itself noted after various lengths of time. Even in the chronic cases subjective and objective improvement was noticeable almost from the commencement of the treatment, and improvement in regard to duration or intensity or in both. Amelioration of shortness of breath was noted not only during the attacks but also in the intervals, and bodily exertion, as climbing of stairs, could be borne with greater facility. Simultaneously with relief of dyspneic and asthmatic difficulties there was experienced a most beneficial influence on the bronchial catarrh. Only in one case no change was noticed during treatment. In all these cases only a limited number of injections was given. Ephraim observed in some cases that nightly attacks would be prevented when the injections were made during the afternoon; that they would come on, however, when the injections were given during the forenoon.

4. *Carbonic-acid Gas in the Treatment of Whooping-cough.*—This subject has been treated by me first in an article published in the *New York Medical Journal*, March 9, 1895, and in two communications, which have appeared in the same journal, November 30 and December 28, 1895.

During the spring of 1897 I addressed myself to Dr. Joseph O'Dwyer. He, in a most amiable letter, accepted my proposition to give the carbonic-acid-gas treatment for whooping-cough a trial in the New York Foundling Asylum. The result was published by Joseph O'Dwyer and Nathaniel Read Nor-

ton in their treatise on whooping-cough, which appeared in the fourteenth volume of "The Twentieth Century Practice." During 1897, at the New York Foundling Asylum, 150 cases of pertussis were treated by the carbonic-acid-gas douche. Of the whole number, 143 of the patients showed very marked benefit. The vomiting ceased, even in the severest cases, by the second or third day, the whoop disappeared, and the number of paroxysms was reduced to two and three daily. The seven remaining patients were apparently not benefited; one of the seven was well along in the disease before this treatment was instituted. The duration of the disease, so far as could be determined, was not influenced. Not the slightest ill effect of the treatment was observed. During the administration of the gas the faces flushed decidedly, and this lasted some fifteen minutes. The treatment was given three times daily, some two or three hours after meals. In infants the treatment lasted five minutes at each time; in the "runabouts" ten minutes. The treatment has been the most satisfactory ever used in the institution.

In the month of July, 1898, the treatment by the gas of a large number of cases of pertussis in the New York Foundling Asylum was again commenced. The report will be presented at some future time.

5. *Carbonic-acid Gas in the Treatment of Dysentery.*—My most satisfactory experience with the gas in this affection I published first in the *Annals of Anatomy and Surgery*, December, 1883, and later in an article which appeared in the *New York Medical Journal*, March 9, 1895. It was only recently, while looking up the whole literature on carbonic acid as a therapeutical agent, that I found in Sobeinheim-Lessing's *Handbuch der speciellen praktischen Arzneimittellehre*, Leipzig, 1863, the following information: "Finally the gas exhaled by the mineral springs containing much carbonic acid is used externally against putrid, scorbutical, carcinomatous ulcers. I am constrained also in this place to recommend the carbonic-acid-gas douches into the rectum." For almost fifteen years I had been under the impression of having been the first to recommend carbonic-acid-gas douches in dysentery.

6. *Carbonic-acid Gas in Impotence and Some Gynecological Affections.*—The first noticeable effect of carbonic-acid baths is a peculiar sensation of warmth, with pricking, especially at the perineum, from where it extends gradually over the whole body, reddening the skin. This effect is most marked on the inner surface of the thighs, on the perineum, on the scrotum, the labia, in short, on all parts which are especially well supplied with sensitive nerves.

The frequency of the pulse is at first diminished; after twenty minutes it becomes normal again, and after prolonged stay in the bath it exceeds the normal. During the bath there is an increased desire to micturate, and afterward the amount of urine voided is unusually large. The physiologic effect is, therefore, congestion in the vascular system, and irritation of the peripheral nerve-ends. Carbonic-acid baths have been recommended in affections of the nervous system in general; as, for instance, hypochondria, hysteria, neuralgia, peripheric paralysis, and in combination with gymnastics in disorders of circulation.

The rational application of carbonic-acid-gas baths or douches in the treatment of impotence and some gynecological affections is of great importance. Careful investigations have proved that the effect of carbonic-acid water does not essentially differ from that of carbonic-acid-gas baths, in most cases; moreover, as much or more service may be rendered by the simple gas douche as with either water or gas bath. Physicians at watering-places are aware that men who are easily excited will have erections during their stay in the carbonic-acid water-bath, and that in many the libido becomes markedly stronger under treatment by such baths. It is the peripheric irritation near the sexual organs which increases sexual sensation in men of this class. This erection is especially noted when the rectum is inflated with carbonic-acid gas. Evidently it is due to the innervation, discovered by Fellner, of the rectum by branches of the nervi erigentes. It goes without saying that those forms of impotence which depend on malformations, congenital defects, diseases like diabetes, nephritis, cerebral lues, tabes, and atrophy of the testicles are not amenable to treatment by carbonic-acid gas. Carbonic-acid gas is, however, an excellent remedy in neurasthenia sexualis, in nervous impotence caused by diminished utilization of the capability of the spinal centers, or by disorders of their reflex conduits.

In cases of spermatorrhea, polutiones diurnæ, ejaculatio præcox, in which the nervous weakness depends on morbid irritability of the spinal apparatus for ejaculation, carbonic-acid gas is not to be resorted to; in such cases hydrotherapy and electricity are the means to be considered, because our object here must be to reduce irritability and to improve the power of resistance. It may, however, happen that after the last-named remedies have done their work carbonic acid will be indicated.

In general, carbonic-acid gas is a remedy to be applied in cases of missing *erectio* and *libido* not combined with spermatorrhea, in which the difficulty has no other basis than the purely nervous. The

grave forms of impotentia paralytica and psychica are also to be excluded. An exceptionally favorable field presents itself in impotentia senilis praecox.

In the female, conditions of oppression or atonia or torpor of the sexual organs may be relieved by means of carbolic-acid-gas douches, and sterility depending on anaphrodisia may be cured. During sexual excitement a constriction of the vagina takes place by which means retention of sperma is aided. The uterus at these times descends into the pelvis, the os opens, and ejaculates mucus of alkaline reaction from the cervical glands, which secretion acts on the mobility of the spermatozoa simultaneously with the ejaculation, and erection of the lower uterine segment takes place, which erection changes post-cohabitationem into relaxation, whereby the sperma is aspirated. The absence of this erection often is the cause of sterility, and in such cases carbonic-acid-gas douches may prove of service. It is well known, however, that exceptionally, women may conceive who experience no erection, no excitement. There are cases in women as well as in men of absence of sexual excitation, in which no benefit can be expected from the application of carbonic-acid gas.

I have found the gas, also, a most reliable agent in the treatment of vaginismus.

Démmé of Philadelphia describes a case of puerperal eclampsia in which the os was rigid and unyielding; it dilated under the influence of the carbonic-acid-gas douche. In another of his cases this douche gave most marked relief in painful labor and seemed to aid dilatation of the os. In a number of other cases he succeeded in rendering labor painless by applying the gas douche to the os for a minute or two every ten minutes. Démmé's experience is easily explained by the fact that carbonic acid produces local anesthesia especially on mucous surfaces; difficult, however, it is to explain why this effect is not generally made use of in midwifery. Scanzoni, in the year 1857, recommended carbonic-acid gas as a means to induce premature birth. Notwithstanding that the prominent gynecologists, Simpson, Hohl, and Gustav and Carl Braun have contradicted Scanzoni and have furnished conclusive evidence that he was in error when he attributed to the carbonic-acid douche the power to cause contractions of the uterus, his assertion is frequently met with in literature. Hohl says that carbonic-acid gas induced into the vagina would be as little apt to cause contractions of the uterus as if it was applied to the abdominal wall. It would require too much space to enumerate here the proofs of this assertion, which are given in the writings of the four gynecologists named. I reported as early as the year 1885 on cases of incessant vomiting in pregnancy in which

I had successfully applied the carbonic-acid douche. In a case which I at first supposed to be one of amenorrhea I convinced myself that the carbonic-acid-gas douche applied to either vagina or rectum is not apt to induce abortion. My patient lived in the country. I did not see her for weeks, but when I saw her again she had, according to my instructions, several times a day and every day for weeks in succession applied the douche, part of the time to the vagina and part of the time to the rectum. At this visit I discovered that she was pregnant in the third month. The pregnancy is still progressing. It is true Ephriam applied the carbonic-acid douche to the rectum in a case in which he did not suspect pregnancy, and after the third application abortion took place. Ephriam says that this one case does not prove that the douche was the cause of the abortion.

The apparatus which I employ consists of a bottle holding a pint or more with a wide mouth and a rubber stopper, the latter perforated so as to admit a glass tube, which at the external end is connected with a rubber tube, and at the farther extremity a nozzle to be introduced into the rectum. The bottle is to be filled one-third with water. The glass tube in the bottle is to reach as far down as one or two inches above the level of the water. In the water are put about 6 drams of bicarbonate of soda, and then when everything is ready for inflation half an ounce of large crystals of tartaric acid. If pulverized acid is used the development of the gas goes on too rapidly. The bottle is now closed quickly, the carbonic acid rises through the tube, and inflates the rectum. Démmé's contrivance presents the advantage that it can be carried conveniently in pocket or satchel, and is unbreakable. It consists simply of an India-rubber bag with two openings, the one to serve for attachment of the tube, the other for the introduction of the materials used in generating the gas. This opening is closed by a properly fitting cork.

## CLINICAL MEMORANDA.

### TWO INTERESTING AND UNUSUAL COMPLICATIONS OF PNEUMONIA.

BY CHARLES J. ALDRICH, M.D.,

OF CLEVELAND, OHIO;  
LECTURER ON CLINICAL NEUROLOGY IN THE COLLEGE OF PHYSICIANS AND SURGEONS; NEUROLOGIST TO THE CLEVELAND GENERAL HOSPITAL AND TO THE CLEVELAND CITY HOSPITAL.

**CASE I.** *A Rare Complication of Pneumonia Consisting of an Ascending Neuritis of the Phrenic Nerve with Extension to the Brachial Plexus. Recovery, with Permanent Atrophy of a Part of the Shoulder and Arm Muscles.*—J. S., a healthy farmer, forty-three years of

age; previously robust, and from a stanch family. On April 6, 1888, I was called to see him, and found him suffering from an acute attack of pneumonia of the right lung. It was ushered in by a severe chill and much vomiting. The latter symptom was a pronounced feature during the first week of the disease. He was jaundiced on the fifth day of the disease, and after the first week presented typhoid symptoms—great depression, dry, brown tongue, diarrhea, and muttering delirium. The spleen and liver were both enlarged. At the end of the third week resolution was slowly advancing, and his temperature, diarrhea, and delirium were disappearing, when he was suddenly attacked by severe hiccough. It was constant and violent, and appeared as if in one act of hiccough the diaphragm was rapidly contracted and relaxed two or three times in the space of time usually occupied by an ordinary spasm.

In the face of blisters, galvanism, tight bandaging, snuff, morphin, and the whole gamut of antispasmodics, with little intermission, the hiccough persisted five days and five nights. With little hope we watched him grow weaker and weaker under the awful strain of this "double-barreled" hiccough, as Dr. Latta of Goshen, Ind., aptly called it. On the sixth day of the hiccough it was noticed that the stools were clay-white, and it was decided to give him calomel. An acquaintance with his habit of taking 10 to 20 grains of the drug at a dose in health encouraged me to give the massive dose of 1 dram, divided into three parts, administered at intervals of two hours. The remedy opened his bowels. The hiccough stopped before morning, and he began a tedious recovery. No ptalism was produced. Several days after the hiccough had ceased he began to complain of severe pain in his right shoulder, and a distinct loss of power in the arm and shoulder-muscles was apparent. Hot applications eased the pain, but the whole region was very sensitive to touch.

Examination four months later revealed an appreciable atrophy of the trapezius, spinati, deltoid, and supinator longus muscles, and a noticeable weakness of the whole scapho-humeral group. Two years later the shoulder had not regained its wonted power and contour.

This rare complication of pneumonia was not then recognized as a neuritis of a part of the bronchial plexus by extension from an ascending inflammation of the phrenic nerve. The course of the paralysis and atrophy was characteristic of a brachial neuritis, but its remote relation to the inflamed area and the writer's deficient knowledge of neuritis ten years ago caused him to fail to recognize the true nature of the case.

Hiccough is produced through the agency of the phrenic nerve, and may result from irritation of the diaphragm, peritoneum, or mucous membrane of the alimentary tract. The phrenic has its origin mainly from the fourth cervical nerve, but usually receives contributing filaments from the third and sixth cervical nerves. Hoover and Howard<sup>1</sup> in their excellent paper on "Tropical Abscess of the Liver," state that "phrenic-nerve irritation, besides the local pain, often manifests itself in re-

gions which are supplied by nerves having a common or contiguous origin with the phrenic." Rouis collected 163 cases of liver abscess, in 28 of which there was a history of pain in the region of the shoulder, and he details a case which affords as good evidence as mine of the possibility of an ascending neuritis of the phrenic. A man, aged twenty-three years, had an abscess of the liver which opened spontaneously in the epigastrium. Pain was persistent in the deltoid muscle until the rupture. He lost power in the deltoid, and six months later the muscle was much atrophied. I really doubt the existence of a genuine ascending neuritis of the phrenic nerve, but would rather suspect a neuromyelitis. My reason for this faith is that a patient with neuritis usually recovers, whereas a myelitis always cripples more permanently.

**CASE II.** *Inflammation of the Right Parotid Gland Complicating a Right Pneumonia; Suppuration of Gland; Operation and Recovery.*—Osler<sup>1</sup> says that parotitis, as a complication of pneumonia is an "excessive rarity." He refers to a case mentioned by Traube, and reports the only case that he has ever seen. Dr. A. J. Hamilton<sup>2</sup> has also reported a case. Osler's case was fatal. Hamilton's patient recovered. These are the only reports of cases that I have been able to find, and the following one embraces my entire experience with this very rare complication of pneumonia:

J. H., male, single, white, aged twenty-two years; a music printer by occupation. Previously healthy; good family history. I first saw him in private practice, February 18, 1894. He had experienced a severe chill the night preceding my visit, and had developed a dry cough and severe pleuritic pains in the right side. I found him with a temperature of 104° F., pulse 120, and respiration shallow, hurried, and very painful. The cough was constant and distressing. Physical examination revealed the typical signs of a severe right lobar pneumonia, with a decided pleural inflammation. It proved to be a "frank" pneumonia, and pursued a severe but natural course. The tongue was constantly dry, and the pleuritic pains radiated to the back and right shoulder.

Resolution was well advanced on the twelfth day, when he was seized with severe pain in the region of the right parotid gland. I was sent for and found the gland hot, swollen, and tender. His temperature had risen from 100° to 105° F. He had successive chills and suffered great pain. His temperature for the following four days rarely fell below 104° F. He was evidently a very sick man, and Dr. A. J. Cook was called in council. We were in doubt as to the presence of fluctuation in the greatly swollen gland, but were sure that the patient ought to be sent to a hospital. He was sent to St. Vincent's Hospital on the following day and placed under the care of Dr. N. Stone Scott, who made multiple deep incisions into the inflamed gland and scraped out a quantity of gangrenous gland tissue, and irrigated and packed the cavities. The outlook was indeed gloomy, but to our surprise and gratification he made a prompt rally and an uneventful recovery.

<sup>1</sup> Osler, *University Med. Magazine*, vol. viii.

<sup>2</sup> Hamilton, *Idem*.

**ENORMOUS HYPERTROPHY OF THE KIDNEYS  
AND DILATATION OF THE BLADDER AND  
URETERS IN A CHILD THIRTEEN  
MONTHS OF AGE. SUPPURATIVE  
ORBITAL CELLULITIS.**

By HENRY B. HEMENWAY, M.D.,  
OF EVANSTON, ILL.

**CASE I.**—On May 22, 1893, I was called by Dr. Wm. A. Phillips to assist in the delivery of a breech-presentation case. The child was large, and the mother was rather fleshy, making delivery difficult. Both mother and child did well under Dr. Phillips' care, and I knew nothing more of them until July 11th following, when I was called to see the baby in the absence of Dr. Phillips from the city. I found at that time a well formed female child, with skin slightly yellow, and abdomen prominent. Percussion showed dulness in the lower portion of the abdomen and around the navel. She was peevish, frequently vomited food, and her bowels were inclined to be constipated. Urine was passed frequently, but in what quantity I could not determine.

Considering that the trouble was probably due to obstruction of the portal circulation and indigestion, treatment was directed toward improving these conditions. I understood that from the time the child was born this general treatment had been pursued. Nevertheless, the abdomen continued to increase in size, and the child was evidently losing strength. Respiration and heart action were rapid. Finally, July 23rd, at my request (for the family had been offended on account of the doctor's absence from town, and a misunderstanding with his substitute,) Dr. Phillips was called in consultation. After examining the little patient we retired to consult. We agreed on the probable diagnosis, and on the past treatment. As to prognosis we were not sure. We agreed that she might drop off in a day or two, or she might recover. The rapid shallow respiration, and rapid feeble pulse, irregular as to rapidity, were the most serious symptoms. Neither of us could understand why we could not reduce the size of the abdomen with laxatives. While we were consulting we were informed that the patient had ceased breathing. So far as we could see, when we had been examining her, there had been no change for several days. There was no convulsion.

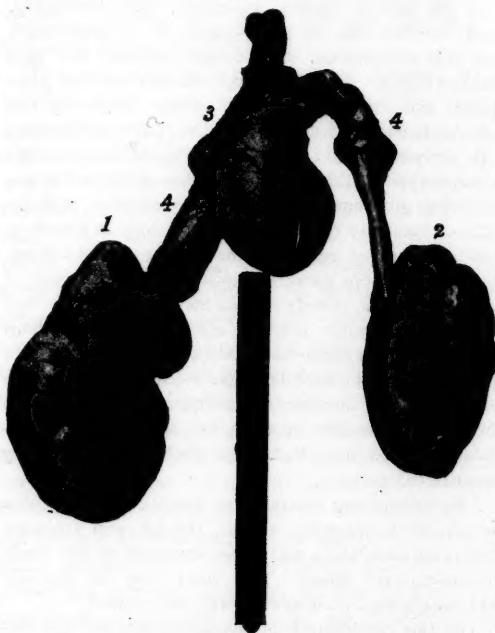
The autopsy, 5½ hours after death, showed slight rigor mortis. There was moderate icterus. Umbilical hernia, not protruding. Subhemorrhagic spots on left lower leg. Incision through  $\frac{1}{2}$ -inch subcutaneous fat was followed by the escape of abdominal fluid—ascitic—which was icteric in color. There was no protrusion into the umbilical hernia, which was produced by the ascitic fluid being crowded into the weakened area. The bowels were normal in appearance, but the entire abdominal cavity was filled with the cystic kidneys and bladder, as shown in the accompanying photograph. These we did not open, as Dr. Phillips desired to submit them to an honored member of the profession for careful examination. I regret to say that the professor referred to died before making a report.

My own theory of the case is that there was a mem-

branous obstruction to the exit of urine from the left ureter. Gradually this membrane was pushed forward until it interfered with the exit of urine from the ureter. In this way there was a constant distention of the bladder, left kidney, and ureter, while urine was discharged from the right side when the tension was great enough to force it by the obstruction. It will be noticed that the relative size of the left kidney is greater than appears from the photograph, it being further from the camera. The rule shown is a foot long, half closed. The left ureter is raised upon a piece of pasteboard. The left kidney was about 5 inches long.

**Family History.**—The father, aged forty-five years, is of bilious temperament. His urine is generally scanty and highly colored with urates. His lungs were "weak"

FIG. 1.



Hypertrophy of the kidneys and dilatation of the bladder and ureters in a child thirteen months of age. 1. Left kidney. 2. Right kidney. 3. Bladder. 4. Ureters.

when he was young. His father died at the age of sixty-seven of consumption, and his mother of "grip" at sixty-two. He has two sisters, aged forty-seven and forty-three years, both in good health. One half-brother died at the age of forty-four of Bright's disease or diabetes. The family used the terms synonymously. His father died of the same disease.

The mother of the patient is aged forty-three years. Health good. Her father may have died of kidney disease, but his final illness was the result of an injury. Mother living and in good health. The patient's mother had seven brothers and one sister, all living and in good health. The parents of our patient had had six children, the oldest being about nineteen years old at the time of the

death of the baby. None of the other children has ever shown evidence of kidney disease.

**CASE II. Suppurative Orbital Cellulitis.** —May 20, 1896, I was called to see Miss M., Irish, aged sixteen years. Thursday, May 18th, she suffered from toothache in the left upper first molar which was badly decayed. She went to a dentist who advised that the tooth be pulled, but she objected. Friday the tooth continued to ache for which she used some "drops" purchased at a drug-store. When I first saw her, at 2 P.M., Saturday, there was marked exophthalmos of the left side, the result of a general orbital cellulitis. The house was small, crowded, and uncleanly. I was not prepared for such a grave case, and so advised that she be sent to the Illinois Eye and Ear Infirmary without delay. Before supper time she was there, and had had the offending tooth extracted. The surgeon in attendance also made an incision into the upper lid. The following Thursday, May 25th, at the earnest request of the parents, who were not pleased with the treatment, I visited the hospital, and there met the surgeon. He is a fine operator in eye surgery generally, being both rapid and neat. This case, however, being out of the ordinary line seemed to stagger him. He attempted to enlarge the external commissure and injected a bichlorid solution into the opening in the upper lid. He suggested to the interne something about an opening into the antrum, but he did not make it nor was one ever made.

June 2nd the patient was brought home and again placed in my charge. There was at that time a profuse discharge of offensive pus. Twice each day the cavity was washed out with a solution of peroxid of hydrogen, or of thymenthol. After a few days it became possible to force the injection into the nasal cavity from the orbit. Two spontaneous openings had occurred, assisted at the last by the knife, one through the lower lid near the inner canthus, the other near the external canthus in the upper lid. The eyeball had evidently broken soon after she had entered the hospital. Gradually the amount of discharge decreased and I was able to detect a sequestrum in the ethmoid region. This I wished to remove in September, but the patient was feeling so much better that she declined further treatment.

I met her recently on the street. The opening in the upper lid still discharges a small amount of pus. The eyeball is apparently about one-third as large as its mate. The cornea is hazy.

Why this abscess should have been opened at its *highest* point I never could understand. Good drainage is absolutely essential in all cases of suppuration. After the case came back into my hands, there was no apparent need for further openings. Those existing, though not ideally located, served well, and it was no longer a question of saving the eyeball even. At first, so severe was the inflammation, I had little hope of saving the sight, and even feared for the patient's life. I regret, however, that I did not at once make a large opening at the bottom of the orbit. Had that been done, and the orbit antisepicized, I think the eyeball, and possibly some sight might have been saved. A preexisting catarrh evidently

had some bearing upon the case, and had the patient permitted the removal of the sequestrum doubtless the fistula would long ago have healed.

## MEDICAL PROGRESS.

**Pulmonary Tuberculosis Treated with Large Doses of Creosote.** —LAMPLough (*British Medical Journal*, May 28, 1898) records the results of treating one hundred cases of phthisis with large doses of beechwood creosote. He was surprised to find that the toxic symptoms which are said to follow the administration of large doses were absent in nearly every case. The method of its administration is as follows:

A few minims of equal parts of creosote and alcohol are dropped into an oronasal respirator, or the patient is treated in a creosote chamber. Five minims of creosote thoroughly mixed in 2 drams of cod-liver oil are administered three times daily after food. Five minims of creosote are to be added every other day to each dose until a maximum of 40 minims three times a day is reached—in about two weeks. If the patient is unable to take cod-liver oil the creosote should be given in 20 minims each of alcohol and compound tincture of gentian and 30 minims of fluid extract of licorice. If the creosote causes a burning sensation this may be at once relieved by sucking a bit of lemon or swallowing milk or water. This symptom seemed to be no more troublesome after a large dose than after a small one. Out of a hundred cases where this creosote was given in these large doses, only five patients were unable to continue taking the drug. Two of these had such advanced lesions that they died in two weeks after admission to the hospital. A third objected strongly to the taste and smell of creosote and refused cod-liver oil, whether alone or mixed with extract of malt. The other two patients were able to take cod-liver oil, and it was given to them pure. Of the 100 cases 62 had disease of both lungs; nevertheless, 68 patients were either partially or entirely relieved of their symptoms and gained in weight, an average of four pounds each in about two-months' treatment. The physical signs also improved greatly in many cases but not in comparison to the improvement in the symptoms.

Although creosote is by no means a specific for pulmonary tuberculosis its good effects are beyond question and the harmlessness of large doses is clearly brought out by Lamplough's daily observation of these patients. So far as could be ascertained from frequent and careful examination of the urine creosote has no injurious effect upon the kidneys. These large doses are well borne by children. Three of the patients treated were between five and seven years of age. In two of them the disease was marked. They all took 30 minims of creosote three times a day with decided improvement and no signs of toxemia.

Having compared the objections raised against the administration of beechwood creosote in phthisis with the results obtained at this hospital by treating 100 cases with this drug, the writer suggests that the following points are worthy of consideration and further investigation:

1. The best beechwood creosote can be given with

benefit, in amounts varying from 120 to 240 minims daily, in cases of pulmonary tuberculosis.

2. The drug is best administered in cod-liver oil or in a spirituous solution, and in some cases the "creosote chamber" or oronasal inhaler may be ordered in addition, with advantage.

3. The dose should be smaller at first, but it can be rapidly increased to 40 minims three times daily for an adult. In 3 cases doses of 30 minims three times a day were well borne by children.

4. Large doses rarely cause any gastric disturbance; on the contrary, the appetite is frequently increased, symptoms of dyspepsia disappear, and cod-liver oil is more easily assimilated. The cough, expectoration, and night-sweats are diminished, and the physical signs improved.

5. Owing to its disinfectant action in the alimentary canal the drug probably diminishes the risk of tuberculous enteritis by auto-infection when patients swallow their sputa, but owing to the increased peristalsis, which is created by creosote, it is usually contraindicated in cases where the ulceration is already advanced.

6. The drug does not tend to cause hemoptysis, but rather to prevent its recurrence.

7. Creosote does not irritate the normal mucous membrane of the genito-urinary tract.

8. Owing to its extremely small cost pure creosote can be given to a much larger number of patients than the carbonates of creosote and guaiacol, which respectively cost four times and twelve times as much as the older drug.

*Gastric Ulcer Successfully Sutured Twenty-four Hours after Perforation.* — CABOT (*Boston Medical and Surgical Journal*, August 11, 1898) reports a case in which he was able to find and suture a perforation in the stomach of a woman of about thirty years of age. The opening was in the lesser curvature and was surrounded by a fibrinous exudation. The indurated area marking the base of the ulcer was about an inch in diameter. This he dimpled into the stomach so that the Lembert sutures passed through healthy tissues. Two rows of stitches were taken. The perforation seemed to have occurred about twenty-four hours before the operation, but no portion of the stomach-contents had escaped; at least none could be detected in the peritoneal cavity, although a large quantity of gas had escaped from the stomach and obscured the liver dulness. The abdomen was irrigated with a salt solution and carefully wiped out. The patient made a steady recovery, the most annoying symptom being excessive flatulence. No food was given by the mouth for several days after the operation. A small gauze drain was used, which was pulled out on the fifth day.

*Reason for the Increase of Cancer.* — WILLIAMS (*Lancet*, August 20, 1898) laments the fact that so little attention is given by physicians to the constant increase of cancer. In England and Wales, in 1840, cancer caused 1 in 129 deaths. In 1896 the deaths due to it numbered 1 in 22 of the total mortality. Thus the proportionate mortality from cancer is now four and a half times greater than it was half a century ago. In this respect its posi-

tion is unique, for no other disease can show anything like such an enormous increase.

Probably no single factor is more potent in determining the outbreak of cancer in the predisposed than high feeding. The consumption of meat has been increasing year by year, until now it has reached 131 pounds per head per year in England and Wales, which is more than double what it was half a century ago, when the conditions of life were more compatible with good living than they are to-day. When excessive quantities of such highly stimulating forms of nourishment are ingested by those whose metabolism is defective it seems probable that there may thus be excited in those parts of the body where vital processes are still active such excessive and disorderly cell proliferation as may eventuate in cancer. No doubt other factors cooperate, especially deficient fresh vegetable food and lack of sufficient exercise.

A remarkable fact about increasing cancer mortality is that it has affected males to a much greater degree than females. Thus while the cancer mortality for males from 1851 to 1890 shows an increase of 167 per cent., the increase for females has been only 91 per cent. Williams explains this upon the ground that modern city life is compelling many more men than formerly to live the inactive overfed existence which has for a long time been the lot of most women. He believes that it lies in the power of physicians and the laity to greatly reduce the occurrence of cancer—perhaps to abolish it altogether—by calling attention to these causative factors, and insisting upon the avoidance of glutinous habits of life.

## THERAPEUTIC NOTES.

*Migraine Due to Muscular Gastric Atony.* — DOL (*Gaz. Heb. de Med. et de Chir.*, June 5, 1898) says that it is well recognized that digestive troubles often cause vaso-motor disturbances, as evidenced by flushed face, cerebral congestion, and other symptoms. There are other symptoms of a nervous character simulating an attack of migraine. Such attacks seem to occur in connection with muscular gastric atony of the stomach. There are two types of this. In one of these there is the sudden onset identical with an attack of migraine but always occurring after a meal. The other type, less violent, is characterized by an intense pain after meals. It possesses some of the points of migraine. The treatment should accomplish the complete evacuation of the stomach and intestines either by vomiting and catharsis or by lavage. Prophylactic treatment in order to cure the atony of the stomach should always follow the measures designed for temporary relief.

### Emetic for a Child.—

B	Pulv. ipecacuanhae	gr. viiss
	Antimonii et potassium tartratis	gr. 1/6
	Oxymel scilæ	3 iss
	Aq. dest.	q.s.ad. $\frac{3}{4}$ i.

M. Sig. For a child of six to ten years, one teaspoonful every ten minutes until vomiting occurs—*Baginsky.*

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SATURDAY, NOVEMBER 5, 1898.

A NEW YORK medical contemporary states that the Emperor of China is dying of systemic poisoning. As, according to the London *Times*, the physician of the French Embassy who examined him reported that he was suffering from albuminuria, incipient phthisis and great debility an appeal to poison in the case, we humbly submit, would seem scarcely called for, and the slur at the Empress, that the *Record* makes, unfounded as far as the evidence goes. It is usual to find the deaths of prominent people, when due to obscure disease, attributed in history to poison, especially if they seemed to occur at an opportune time for some one else, but it is time that this sort of thing should cease now that advances in medicine have made it possible to diagnose diseased conditions with accuracy. In the present case certainly, with a patient suffering from serious pathologic conditions of two important organs, there should be no medical countenance of rumors as to poisoning without authoritative and detailed substantiation of the reports.

A NUMBER of lay contemporaries, and we are sorry to say even some of the medical journals, men-

tioned the first victim of the plague as *Dr. Barish*. He was not a medical man but only a hired assistant in the laboratory, who made media, tended to the animals, and kept the laboratory in order. It is in such men particularly, ignorant as they are, and incapable of being impressed with the seriousness of the dangers they run, that familiarity begets contempt, until finally some neglect of necessary precaution leads to an outbreak of disease. Under present conditions the presence of such comparatively untrained assistants is indispensable in laboratory work, so that there is absolute necessity for such legal regulation of experimentation with epidemic disease as we insisted on editorially last week. Dr. Müller owed his infection, it would seem, to his voluntarily attending Barish medically, though he knew that he probably had to deal with the most infectious form of the disease, the pulmonic type.

Professor Nothnagel has received a great deal of unenviable notoriety in the matter, though his only connection with it was the circumstance that the experiments were being conducted in the laboratory of his clinic. Dr. Müller, who has been one of Professor Nothnagel's clinical assistants for some years, was the clinical member of the Austrian Plague Commission which went to India a year ago last spring. He brought home the cultures with him and not unnaturally used the laboratory he had at hand. Laboratory room is not over generously supplied in Vienna, especially in the General Hospital. Workers must be satisfied with the least possible conveniences, in cramped quarters. With them scientific enthusiasm must make up for the tempting airiness and roominess of the modern laboratory of research.

THE third part of the address of Sir William Crookes, at the recent meeting of the British Association for the Advancement of Science, entitled "The Position of Psychical Research," contained statements which, if emanating from any other man of equal eminence in the scientific world would have caused unbounded surprise. It was, however, known to many that thirty years or more ago this renowned physicist published an account of experiments which he believed tended to show that outside our scientific knowledge there exists a force exercised by intelligence different from the ordinary intelligence common to mortals. The fact that he is

now President of the Society for Psychical Research indicates that his interest and belief in such a force has not abated. Despite this, it must be reckoned an epochal date when the president of a society, numbering in its membership more pure scientists than any other in the world, has the temerity to assert that telepathy is based on the fundamental law that thoughts and images may be transferred from one mind to another without the agency of the recognized organs of sense—that knowledge may enter the human mind without being communicated in any hitherto known or recognized way. The speaker made no explanation of the foundations for his belief, and gave scarcely a reason or argument for their validity, save to point one or two analogies and to restate an hypothesis. This hypothesis, *vis.*: that the dendrites of neurons and the terminal arborizations of neuraxons do not actually touch, but are separated by a narrow gap which widens in sleep, while it narrows almost to extinction during mental activity, has been very widely discussed by neurologists and physiologists during the last few years. To-day, it is impossible that there exists six leading neurologists in the entire world who believe that the "movements of the neuron" is even a working hypothesis to explain neural and mental dynamics. This part of this noteworthy address will probably be read with trepidation and pain by all honest scientists, save a few who pose in the mantle and cling to the edges of the Society for Psychical Research.

#### COLONEL WARING'S DEATH.

IN the death of Colonel George E. Waring, New York City loses one of her great citizens; the country a man who can ill be spared in the presence of the great questions in civic and military sanitation that face our government at the present time. Modern applied sanitary science contains some extremely interesting and practical chapters that will keep the name of Waring alive during future generations. What he accomplished at Memphis, Tennessee, and in Central Park, New York, at a time when sanitary science was but just emerging into life, remain as monuments to his skill and intelligence. His organization of the street-cleaning department of the City of New York was enough of itself to make him famous and to give him a prominent place in the an-

nals of public health at the end of the Nineteenth Century. By it he has conferred a boon upon the city the extent of which even its most intelligent and vigilant citizens scarcely realize. The methods he introduced will continue their benefits for future generations.

Though his age might well have justified him in asking to be excused from active and exacting duty in the public service, he accepted without hesitation the President's invitation to investigate the condition of Cuba and especially of Havana, with the idea of suggesting the sanitary measures necessary to provide healthful places of residence for American citizens and, especially, sanitary quarters for American troops, who will have to be maintained there probably for some years. He was returning home with the data collected that would be necessary for his preliminary report in the matter, when the first symptoms of his fatal illness developed. It seems almost like the irony of fate after his successful battle with yellow fever in other places that now when ready to put the finishing touches to the work by uprooting the evil at its very source and so prevent all future epidemics of the disease in our country he should be stricken down and, with resistive vitality lowered by age and recent exhausting work, prove an easy victim. All honor to him as a champion of humanity against dirt and disease.

His death leaves a gap which will not be easily filled, but the Government must face the great problem of the sanitation of our new possessions, and this latest sacrifice is but another forecast of what a cost of life it may involve.

#### PROFESSOR VIRCHOW AND THE UNITY OF LIFE—A PROTEST.

WE recently reviewed Professor Virchow's Huxley Lecture in that spirit of enthusiastic regard with which we are sure his distinguished English audience must have received it, and with which the medical world must ever welcome the great sayings of the father of modern pathology. This week we permit ourselves, in the reverential spirit of disciples of the man who above all others taught medical men to think and seek for themselves and to accept nothing on the *ipse dixit* of a master, to discuss some of the propositions it contains.

Professor Virchow thinks (we quote from the address as published authoritatively in the *British Med-*

ical Journal; as it was delivered in English we have the speaker's own words) that "In a medical school where the teaching is almost entirely concerned with human beings we might put this sentence at the head of the lesson: 'The organism is not an individual but a social mechanism.'" He said just before, "The life possessed by the higher organisms is not a single life. . . . Each constituent part of a living organism has its special life, its *vita propria*. . . . As regards materialistic construction man and the higher animals and plants are no unitary simple beings. . . . If they possessed but one single power which set all their parts in action it would be impossible to understand how the special kind of activity which each one of these organisms exercises in its individual way comes about. . . . How can a single power, whether we call it in the spiritualistic sense spirit, soul, *spiritus rector*, or, in the physical sense, vital force, or electricity, build up such diverse organisms? . . . The first requisite for a correct interpretation (if such a collective being is analyzed) is that one should *discard the fabled unity* (italics are ours) and should regard the single parts, the cells, as the factors of existence."

We have not quoted a series of connected passages because space forbids it; on the other hand, we have not, we can confidently say, wrested any of the sentences from their author's meaning in separating them from their context. The series of sentences quoted represents a materialistic view of man as a living organism which we feel sure is not shared by the majority of, at least, English-speaking medical men and scientists. These views will receive widespread circulation in our medical journals and will lead to false assumptions as to the stand modern medicine is taking in the matter, if they are allowed to circulate without a word of protest.

The human organism is "a social mechanism," all the cells of which are in health coordinated by that mysterious force we call life; not the multiple life of the individual cells but the unitary principle which, the moment previous to sudden traumatic death, made the now insentient mass of lifeless cells living, sentient, conscious, thinking man. We do not know *how* "a single power sets all the various parts", the multitudinous cells, in action, but we do know that man is a single simple being, with a single principle of life,

and not merely a congeries of cells more or less fortuitously bound together.

Medical men generally (we speak at least for our English-speaking brethren) believe this because they believe in the existence of something beyond and above matter, spirit, and in the existence of a spiritual principle of life in man, the human soul. They have evidence for their belief in the existence of their own consciousness which is surely not a function of matter, in the realization of their powers of reasoning which is indubitably not merely material. The principle of life that originates these higher functions must be of such a nature as to produce them and must itself be superior to matter.

Modern science, and especially the sciences that are most closely related to medicine, are getting farther and farther away from the position that would explain all vital phenomena on merely materialistic, *i.e.*, chemico-physical grounds. Spontaneous generation is gone, thanks not a little to Virchow's own work. The supposed simple processes of endosmosis and exosmosis in metabolism and of simple oxidation in tissue waste and repair have given place to complicated intracellular processes dependent on essential cellular activity brought into play by that mysterious force called life. A very interesting commentary on this question of vital force and of the unity of organismal life from the physiologist's point of view may be found in "Vitalism," an article in the *Nineteenth Century* for September by Mr. Haldane, lecturer on physiology at Cambridge, England.

Science has been giving us the demonstration, too, that behind this vital activity in individual cells there is a force that makes for the conservation, and during the developmental period for the proper development of the *whole* organism. If in certain of the lower forms of life during the embryonic period, one-half of the cells that make up the embryo be removed, the other half will develop sufficiently to make up for the cells that have been removed and the resulting organism will be perfectly normal. In certain of the lower animals too, removal of a limb is followed by the growth of a member to replace it which exactly corresponds to the one that was removed. We have in these facts surely not the result of multifarious individual cellular activity but the evidence of a principle of life, higher

than mere cellular activity, pervading the whole organism coordinating cellular energy and providing for the protection and conservation of the *whole* being.

Professor Virchow himself says in this Huxley lecture, "The necessity for a single basis of all vital manifestations remains. It is a question which is not alone of great theoretical interest, but it has become an indispensable foundation for practical work and particularly for medical practice." Here is the keynote of the matter for the practical physician and for our present-day therapeutics. For changes in cells, at least as far as regards the gross alterations that constitute the only cell changes we know so far, we are able to do very little. Modern therapeutics is just beginning to make use of the products of cellular activity in order to restore or replace the functions of damaged cells. As yet, however, this form of therapy is extremely limited in application. Practically, all of our pharmaceutics is dependent on the principle that there is a single basis of life and that the organism is a compensatory mechanism. The results of this system of therapy, while not all that might be wished, have been such in the hands of our great practical clinicians as to justify the conclusion that there is a great truth underlying it.

The most striking thing in modern medical practice is the influence of mind over body, of vital force above and beyond any individual cellular activity, that must be reckoned with in all rational treatment of disease. Medical realization of the influence of this higher force has been growing clearer not dimmer in recent years. It is evident then, that the medical profession is on scientific grounds drifting away from, not toward any opinion that would deny the essential unity of organisms, especially of man.

## ECHOES AND NEWS.

*Smallpox at Norfolk, Va.*—An epidemic of smallpox is announced at Norfolk, Va. Fifteen new cases were reported on October 31st.

*The John Blair Gibbs Hospital.*—The Government has very appropriately commemorated the sacrifice of the first American soldier on Cuban soil by naming the general hospital attached to Camp Hamilton at Lexington, Ky., the John Blair Gibbs Hospital.

*Tetanus Recovery after Antitoxin Treatment.*—The patient at Passaic, N. J., who suffered from tetanus and was recently treated by the injection into his brain of antitoxin

serum continues to improve. He has become so well that it has seemed wise to apply skin-grafting to the injured leg.

*A Public Hospital at Troy, N. Y.*—The formal opening of the Samaritan Hospital at Troy was celebrated October 23d. This new hospital is modern and complete in every detail. One of the wise provisions connected with the management of the institution is that by which any private patient who enters the hospital has the privilege of choosing any medical attendant he desires, the hospital thus being free to the profession as well as to the laity.

*Medical Society of the State of New York.*—The Business Committee of this Society announces that the next meeting of the Society will be held at Albany, January 24, 25, and 26, 1899. The committee consists of Dr. Willis G. Macdonald, Albany, N. Y., Chairman; Drs. Edward B. Angell, Rochester, N. Y., and James M. Winfield, Brooklyn, N. Y. Members desiring to present papers will please notify the chairman of this committee.

*Obituary.*—Dr. Francis L. Haynes died from embolism of the brain at his home in Los Angeles, Cal., October 19, 1898. Dr. Haynes was graduated from the University of Pennsylvania in 1870, at the age of twenty years. After serving as interne in the Episcopal Hospital, Philadelphia, for eighteen months he began the practice of medicine in Philadelphia where he remained till 1887, when he removed to Los Angeles and became Professor of Gynecology in the University of Southern California, hoping that a change to a milder climate might improve his health, which had become impaired.

*Dr. Guiteras to Go to Cuba.*—It is generally understood that Dr. John Guiteras, the great yellow-fever expert, will resign the chair of pathology in the University of Pennsylvania at the end of the academic year and with his family go to Cuba. Dr. Guiteras has been tendered the chair of practice of medicine in the University of Havana. He will be accompanied by several other medical men of high repute who are interested in Cuban affairs. It is Dr. Guiteras' intention to enlarge the medical course at the University of Havana and place it on a footing with similar courses in this country.

*Christian Science Malpractice.*—The facts connected with the treatment of Harold Frederic by the Christian-Science woman prove to be more startling than the first reports indicated. At the coroner's inquest the woman admitted that she had not diagnosed Mr. Frederic's "material" sickness; that she could not describe his physical condition, and that she did not allow her patients to follow doctor's orders. Moreover, she confessed to having taken her patient for a drive only a short time before he died, of heart disease, and did not know that it was the worse thing she could have done for him.

*Medical Students in German-Speaking Universities.*—In the last issue of the *German Universitätskalender* the number of students of medicine in the several universities using the German language is given as follows: Munich,

1416; Vienna, 1192; Berlin, 1090; Würzburg, 680; Leipzig, 630; Freiburg, 552; Kiel, 428; Graz, 417; Erlangen, 414; Breslau, 364; Zürich, 340; Bonn, 337; Strassburg, 324; Grieswald, 323; Tübingen, 278; Marburg, 274; Heidelberg, 272; Geneva, 270; Königsberg, 249; Halle, 245; Giessen, 240; Göttingen, 225; Jena, 222; Berne, 189; Lausanne, 145; Basel, 141; Rostock, 99. Total, 11,376.

**Mental Pressure in Our Public Schools.**—President Schurman, in his recent address at the opening of the fall semester at Cornell University, makes the statement that the age of freshmen at entrance has been falling continuously for three years, although the standard of requirements for admission was at the same time continuously rising. "The average age of Cornell freshmen was nineteen years and eleven months in 1895-96, nineteen years and eight months in 1896-97, and nineteen years and seven months in 1897-98. This seems to show," continues Dr. Schurman, "that the high schools of the country are quite rapidly increasing in efficiency." It would be interesting and valuable to know also the relative physical condition of these youths compared with their predecessors.

**Spread of the Bubonic Plague.**—The sudden appearance at Vienna of the bubonic plague and its deadly work there, discussed editorially in our issue of last week, has centered no little interest upon the possibilities of its more widespread development. If it has awakened increased vigilance in quarantine circles it is well. A recent cablegram from St. Petersburg announces that the epidemic now prevailing at Samarkand—a large commercial city of Turkestan—is the true plague, and that the mortality is high. The arrival at San Francisco, October 28th, of a French vessel from Hong Kong, infected with bubonic plague is also reported, the captain and one seaman having died of that disease during the voyage, August 20th and September 20th respectively.

**Medical Nomenclature.**—Under this heading the *Medical Record*, October 29th, remarks: "To the reader or hearer who has some regard for accuracy in the formation and use of words such combinations as 'radiograph' is apt to give a shock. . . . Of late the much more appropriate term 'skiagraph' has supplanted it to a great extent." The latter term was originally suggested in the *MEDICAL NEWS*, February 15, 1896, by Dr. Cattell, in one of the earliest accounts of the Röntgen-ray published in this country. The *MEDICAL NEWS* has consistently used the word since that date. It is gratifying to have the assurance that it is supplanting the monstrosity "radiograph" and that this tardy recognition of its merits by the *Record* gives earnest of the latter's influence in bringing it into more general use.

**Sick Soldiers from Porto Rico.**—The Massachusetts hospital-ship "Bay State" arrived at Boston October 28th from Porto Rico. The ship carried 133 on her sick-list, mostly men of the Sixth Massachusetts Regiment. Of this number thirty are very ill. Two men, Sergeant William E. Watters, Company E, of Framingham, and Paul T. French, Company M, of Milford, died at sea. Private

French was buried at sea, and the body of Sergeant Watters will be turned over to his relatives. The United States Army hospital-ship "Missouri" arrived at New York October 29th from Porto Rico with 271 sick and wounded soldiers, most of them suffering from malarial fever, typhoid fever, or dysentery. L. Burton Bradish, Corporal, Company A, Third Illinois, and Henry M. Morrison, private, Company H, Fourth Ohio, died; the former was buried at Mayaguez, the latter at sea.

**Effects of Electricity upon Plant-Life.**—In the light of the views promulgated recently by Sir William Crookes it is interesting to note the results of some practical experiments demonstrating the fertilizing effect of electricity in plant-life. Dr. Lemström, aided by Baron Hisinger, a landed proprietor of Finland, has been engaged in experiments on growing plants since 1885. Six fields, each fifty meters in extent, were devoted to these experiments, three being subjected to electricity, and three used as control-areas. The benefit of the electricity was marked; there was found an increase in the seeds of at least 40 per cent.; in the roots from 25 per cent. to 75 per cent., depending on the kind of plant and on the nature of the soil; in beans 75 per cent., in strawberries and raspberries as high as 75 per cent., the time for their ripening being advanced at least one-third. Either the gases in the air are transformed by the electricity into ozone and nitric oxids, which, being heavy, fall down upon the plants and increase the activity of their vegetation, or the electricity induces the juices of the plants to ascend more rapidly in their capillary tubes. Though much has yet to be explained, the method is ready to be used for practical purposes. The author this summer carried out experiments in Finland on some especially interesting plants. Of these, the tobacco plant did not yield, in earlier experiments, to the favorable influence of the electric currents, through want of water.

**Sanitary Report from Havana.**—The following report for the week ended Thursday, October 20th, by the local inspector, Dr. Brunner, has been forwarded to the Surgeon-General of the Marine-Hospital Service: The temperature for the past week has been intolerably warm; the rainfall has been excessive, especially during the last three days, when certainly more than five inches must have fallen, the downpour extending into the nights, which does not often occur here. The neglect of sanitary matters still continues; the streets and public markets reek with filth, and the paved streets need repairs to prevent the collection of storm water and surface filth. There were six deaths from yellow fever, which are three less than the preceding week; four of these deaths occurred among the Spanish soldiers. One of the deaths was credited to borras fever, which, in my opinion, is fatal yellow fever among the Cubans. There was a slight falling off in all the other fevers prevailing here and the total deaths show a decided decrease. The two deaths from beriberi occurred among the Chinese population. The American bark "Maryland" reported by letter and cable as being infected with yellow fever is still in port, but is ready to leave for Baltimore after pro-

ceeding to Tortugas for disinfection. While there are not many known cases of yellow fever, yet on account of the extremely hot weather and the continuance of the rainy season, I would recommend that the close quarantine season be extended from November 1st to November 15th.

*Slept Fifty Days.*—A case of somnolence occurred in England within the past year, in which the patient, a young naval officer, slept for more than fifty days. During the year preceding his long sleep his time had been spent in severe study and he had not allowed himself the proper amount of sleep. His year's work culminated in a severe competitive examination for position in the navy, in which examination he was one of the fifteen successful applicants. About a week after his examination he began to grow drowsy, and promptly went to sleep from which he could with difficulty be aroused. A couple of days later he sank into a calm, peaceful sleep, from which it was impossible to arouse him completely, and when aroused partially he would drop off again almost immediately into deep slumber. No evidence of uremia was discoverable, nor anything suggestive of catalepsy. His color was good during the entire period, his extremities warm, temperature normal, tongue thickly coated with light brown fur, and the pulse slow and feeble. There was no anesthesia or suggestion of headache. The knee-jerk was exaggerated, particularly on the left side, and ankle-clonus was sometimes present. The sleep was at no time "profound." Toward the end of his sleep he could be more easily aroused, took more nourishment, and began to gain in weight. When he awoke he had perfect recollection of all the events that had transpired up to the day he went to sleep, but none of anything that had been done to him during his sleep. He had to learn again how to walk and how to balance himself. He regained his coordination rather slowly, and at the end of four months after his awaking had not completely regained his ability to walk naturally. Two months later he had so far recovered as to attend to his duties on board ship.—*British Medical Journal.*

## CORRESPONDENCE.

### MEDICAL MATTERS IN CHICAGO.

[From a Special Correspondent.]

DRY-AIR TREATMENT OF TUBERCULOSIS—OFFICERS OF THE CHICAGO GYNECOLOGICAL SOCIETY—ACUTE CEREBRAL MENINGITIS—INFLATION OF BILIARY PASSAGES TO DETECT SITE OF STONE—TREATMENT OF TYPHOID FEVER—THE VALUE OF WIDAL'S TEST.

CHICAGO, October 31, 1898.

THE Murphy plan of treating pauper patients afflicted with tuberculosis of the lungs is to be given a trial at the new Charity Hospital which will be opened for the reception of patients at Dunning on November 1st. This institution is designed to put in practice the dry-air treatment for consumption, and will accommodate 450 patients. The object is to reproduce, as nearly as possible, the climate of Arizona and New Mexico. The County Board of Commissioners appropriated \$60,000

for this hospital, and more recently \$3000 more has been set aside to complete the work. Statistics show that  $\frac{1}{4}$  of the deaths in Chicago are caused by consumption, and that  $\frac{3}{4}$  of all of the deaths in the civilized world are due to the same disease. Among those who die between the ages of twelve and sixty years the cause in one-fourth of the cases is tuberculosis.

At the annual dinner of the Chicago Gynecological Society, recently held, the following officers were elected for the ensuing year: President, Dr. Nicholas Senn; vice-presidents, Drs. Thomas J. Watkins and Reuben Peterson; secretary, Dr. William H. Rumpf; treasurer, Dr. Addison H. Foster; editor, Dr. Charles S. Bacon.

Dr. Daniel R. Brower read a paper before the Chicago Medical Society recently on acute cerebral meningitis, in which he reported forty-six cases occurring in his own practice and that of others, with thirty-three recoveries and thirteen deaths. In the treatment a dark, well-ventilated, quiet room is selected. The patient's head is shaved and surrounded by ice-bags; leeches are applied over the temples; the pain is mitigated by morphin or antipyrin hypodermically; the temperature is reduced by cold sponging; the bowels are freely moved by calomel, and every day there is applied freely to the scalp a ten-per-cent. ointment of iodoform in lanolin. The difficulty of administering medicines by the mouth in these cases led him to adopt the treatment by inunction about fifteen years ago, first with mercury, without success, and then with iodoform, with some success. Absorption usually takes place promptly, so much so that he has been able to detect the iodin in the urine and saliva one hour after inunction. The amount absorbed cannot be very great, inasmuch as he has never seen the untoward effects that sometimes follow the use of iodoform in open wounds, although he has used as much as 10 grams (154 grains) of the drug in one case. He has suggested this treatment in consultations in at least a hundred cases, but has been able to learn of the results of treatment in forty-six cases only.

At a subsequent meeting of the Society, Dr. Weller Van Hook spoke of inflation of the biliary passages in operations for cholelithiasis. In a case of choledocholithiasis he had injected air into the biliary passages to demonstrate the site of the stone in relation to the other ducts and to enable him to pass metallic sounds upward and downward along the ducts. The air was injected by means of a small bicycle pump, which was attached to a rubber tube fastened into the gall-bladder by means of a metallic tip. The method may be applied to any operation upon the biliary passages, enabling one to determine the location, size, and relations of these passages; to map out the position and relations of a stone, and to demonstrate fistulæ and diverticula.

At a meeting of the Chicago Society of Internal Medicine, held October 19th, Dr. J. M. G. Carter presented a contribution on the treatment of typhoid fever, based upon a study of seventy cases. Before he began the treatment of these patients his observations had convinced him that the danger in typhoid fever lies in the pronounced exhaustion present in this disease. In an

attempt to find a scientific line of thought he has been guided by the knowledge first, that typhoid fever is a bacterial disease; second, that typhoid bacilli exist at all times and in nearly all places, but in varying numbers; third, that under certain conditions the number or activity of these bacilli, or perhaps both, may be increased; and, fourth, that the virulence of the disease depends upon the number or activity, or both, of bacilli in an individual case. A careful consideration of these facts led him to conclude that the treatment may be reduced to meeting three indications, only two of which are always of paramount importance: the maintenance of the patient's strength by proper nutrition and the removal of the cause and reduction of temperature. The determination of what diet is proper in a case of fever is of the utmost importance. The high temperature of the patient must be combatted with antipyretics. He has never used the Brand system of cold baths. Ordinarily he makes use of quinin or of some coal-tar derivative combined with a heart tonic, or tepid, cool, or cold water for bathing. Sometimes he combines the two methods. He gives aromatic sulphuric acid and tincture of digitalis combined throughout the entire course of the fever. He did not give salol, sulphocarbolate of zinc, salicylate of bismuth, or other antiseptic in his treatment of the first fifty-five patients, although he did administer aromatic sulphuric acid, and some of the severest forms of the disease he has treated were included in the group reported. Other remedies are given only as may be required to meet emergencies as they arise. A happy result of this treatment is a more rapid convalescence than is secured when over-feeding is not allowed, but the course of the disease is not abridged in many cases.

Dr. Adolph Gehrmann gave the results of Widal's test in the diagnosis of typhoid fever from dried blood specimens. He gave an analysis of 340 examinations. His conclusions were: (1) that dried blood specimens give results sufficiently accurate for public-health purposes, contrary to the opinions of some writers; (2) it is the simplest means of obtaining and transporting material for examination; (3) the development of the method employed is of more importance than slight changes of technic, as regards accuracy of results; and (4) the test is not an early diagnostic sign, and is not generally conclusive before the end of the first week of the fever.

## SOCIETY PROCEEDINGS.

### NEW YORK STATE MEDICAL ASSOCIATION.

*Fifteenth Annual Meeting, Held in Mott Memorial Hall, New York City, October 18, 19, and 20, 1898.*

(Continued from page 576.)

#### THIRD DAY—MORNING SESSION.

The Secretary was instructed to cast the ballot of the Association for the following officers for the ensuing year: President, Joseph D. Bryant of New York County; vice-president, J. G. Hunt, First district; D. C. Moriarta, Second district; F. D. Reese, Third district; W. M. Be-

mus, Fourth district; secretary, M. C. O'Brien, New York City; treasurer, E. D. Ferguson, Troy. Council—Jno. P. Sherer, C. E. Fritts, L. J. Brooks, Delancey Rochester, Chas. E. Dennison.

The discussion of

### INTESTINAL OBSTRUCTION

was continued by Dr. Frederick Holme Wiggin of New York in a paper on "The Technic of Operative Treatment of Intestinal Obstruction," a very complete paper, of which some of the practical points were as follows:

When volvulus occurs in the small intestine it is not only safe but desirable to draw the intestine out of the abdomen, taking care to keep it hot and moist by wrapping it in gauze or soft towels wrung out of hot saline solution. When an intussusception is the cause of the obstruction the tumor should be encircled below its apex by the finger and thumb and the sheath held a few inches lower down, while the apex of the tumor is pushed upward. Traction from above the tumor should not be employed. If the intussusception is irreducible, the following method, described by Maunsell, is recommended: A slit is made in the intussusciens and gentle traction is exerted on the intussusceptum until its neck appears outside the opening in the intussusciens. The base is then transfixed with two straight needles, armed with horsehair, and the intussusception is amputated one-fourth of an inch above the needle. The sutures are now passed through the invaginated bowel, caught up in the interior of the bowel, divided, and tied. The invagination is then reduced, and the slit closed. Thanks to modern surgery, most neoplasms causing intestinal obstruction can be removed, and naturally such a course is preferable to colotomy. Where it is inadvisable to resect the portion of bowel containing the growth, an incision, four inches long, should be made over this portion, in the direction of the fibers of the external oblique, and the bowel drawn upward until its mesenteric attachment is on a level with the external incision. A slit is then made in the mesentery and a glass rod is passed through, and iodoform gauze wound around the ends of the rod. The rod is left in position until adhesions have formed, when the gut is opened.

When the intestinal obstruction results from the pressure of a neoplasm external to the gut the new growth should be extirpated, but if this is not possible, a fecal fistula must be established above the point of obstruction. Gall-stones or enteroliths causing obstruction should be pushed a little upward or downward and then removed by an incision. The object of this is to avoid making the incision through the portion of the gut which is likely to have been damaged by pressure. When the gut is found to be gangrenous, in a case of intestinal obstruction, an end-to-end anastomosis should be done, and for this purpose Dr. Wiggin prefers his modification of Maunsell's method. The modification consists in doing away with the invagination and the slit. The portion of intestine to be extirpated is emptied of its contents by pressure. The portion to be removed is then isolated by clamps on either side, and a V-shaped incision is made, having its

apex in the mesentery. The mesenteric vessels are ligated before being cut, and the wound in the mesentery is sutured. After washing the divided ends of the bowel with hydrogen dioxid they are united by two sutures passing through all the intestinal coats, the first suture being at the inferior or mesenteric border, and the second directly opposite at the highest point. The third and fourth sutures are passed on either side half way between the first two. The other sutures are passed in the same way, the needle going from within the gut and piercing all the coats, then back through the peritoneal, muscular, and mucous coats to the interior of the other segment of bowel. The ends are then tied in the bowel. This process is continued until all the sutures but one or two are passed. For the latter, Lembert sutures are substituted. If the sutures have been properly inserted and tied, the peritoneum will now be turned in and the stitches hidden.

After the operation Dr. Wiggin thinks that the tendency is to give too little food and to give what little is allowed too frequently, so causing irritability of the stomach and loss of appetite. His rule is now even in intestinal cases to treat his surgical patients as medical ones, and if they are in good condition, with uncoated tongue, slight fever, and an appetite for food to let them have it in reasonable quantities. In his recent cases of end-to-end anastomosis he has put into the bowel just before inserting the final sutures of coaptation 2 or 3 ounces of saturated solution of sulphate of magnesia (McCosh's method) and has had excellent results. Patients present scarcely any disturbing symptoms on the days immediately after operation. In a very recent case, in which parts of the transverse colon and of the stomach were removed for malignant disease, the patient got along admirably with this expedient. Intravenous injection of normal salt solution quells the thirst and keeps the patient from being restless during the time it is not thought advisable to exhibit liquids.

DR. MARCEY of Boston, in the discussion of this paper, said that the hope for the improvement of the statistics of the surgical treatment of intestinal obstruction lies in early diagnosis and in improvement of the technic of intestinal anastomosis; neither the Senn's rings nor the Murphy button has solved the problem though it was hoped they would. Dr. Wiggin's method was certainly a step in advance. He himself employs a method that saves a good deal of time. He slits longitudinally each end of the bowel to be approximated so that it resembles the cuff or wristband of a shirt. This enables him to bring the ends together and unite them by a continuous suture along a straight line. There remains then to be closed only the longitudinal slits made in the ends of the bowel. This may be done by the Lembert suture. All abrasions of peritoneum and all roughness is covered in as such things inevitably lead to peritoneal adhesions as surgeons are learning by bitter experience at last.

DR. FARRINGTON of Boone County read a paper on

#### THE PASSING OF ALCOHOL

that led to some lively discussion on the subject of alcohol in medical practice.

DR. H. S. OPPENHEIMER of New York County read a paper on

#### EYE LESIONS IN SOME KIDNEY DISEASES.

The better prognosis of all eye lesions from kidney trouble that develops during pregnancy was dwelt upon. Even attachments of the retina in pregnant women not infrequently involute and readhesion takes place after labor. Amaurosis from acute nephritis during the infectious fevers also was dwelt upon. This toxic amblyopia sometimes with complete loss of vision develops suddenly and is most alarming to the patient. There are usually cerebral symptoms but nothing abnormal can be seen with the ophthalmoscope. Prognosis is usually good as regards short duration and ultimate vision.

DR. J. H. WOODWARD of New York County read a paper, entitled

#### SOME OBSERVATIONS OF GENERAL INTEREST REGARDING THE CAUSE AND MANAGEMENT OF CATARACT.

He insisted on the slowness and uncertainty with which senile cataract develops, and deprecated the telling of patients as soon as an incipient cataract is manifest that they have such a hindrance to vision that will gradually get worse and finally necessitate operation. He quoted from his case-book cases from every decade after thirty years of age, where cataracts had remained absolutely unchanged for from five to eight years. He thinks that constitutional treatment is of value in early stages in preventing rapid development.

#### AFTERNOON SESSION.

DR. WM. D. GRANGER of New York County read a paper on

#### INSANITY FOLLOWING SURGICAL OPERATIONS.

A number of such cases are to be found reported in the literature, but greater attention in giving details of the patient's previous life must be reported if the cases are to be of any value in a statistical sense. Predisposition is the all important factor. Heredity being the most active predisposer, certain critical periods, especially of the sexual life, as puberty and the climacteric, seem to be predisposing agents. It is not the gravity of the operation that is the most active factor, for a notable number of cases of insanity have developed after the extraction of a tooth. Eye operations furnish a good proportion too. Most mental aberrations follow operations upon the genital tract in females. Careful inquiry should be made beforehand as to whether the subjects for operations are predisposed by previous mental trouble or by heredity to such accidents.

DR. C. C. FREDERICK of Buffalo, in discussion, spoke of the difficulties of getting such details of patients' lives and heredity. Patients themselves are sensitive, and friends will often say nothing of the patient's neuropathic tendencies, so that the doctor finds out only after insanity has developed that the patient had been in an asylum before.

DR. FREDERICK then read a paper on

## THE PREPARATION OF CATGUT.

Ligatures of silk and silkworm-gut are always liable to be infected and cause troublesome, even dangerous, sinus. Now that catgut can be prepared so as to be absolutely sterile and yet retain its tensile strength, the use of silk is almost unjustifiable. He demonstrated spools of catgut prepared by the formaldehyd (3 per cent.) method, guaranteed to stand boiling well, whose strength was thoroughly tested by those present. This gut can be chromicized to any degree and so its absorption regulated. A feature of the method is that but one row of turns of gut is on each spool, so that all of it is equally exposed to the formalin, and the free ends are tied together across the spool to prevent shrivelling.

DR. THOMAS J. HILLIS of New York County read a paper, entitled

## WHAT TO DO TO BE SAVED,

being the conclusion of the inquiry into the abuse of medical charity. It was listened to with a great deal of interest, tinged with an amusement that was plainly sympathetic. Some idea of the drift of the paper may be gathered from the following characteristic quotations from it:

"The authorities of the hospital of to-day have forgotten the real mission of that institution; that its place is only as a dispenser and vender of medical charity."

"The transformation of the hospital from a purveyor of charity to a colossal corporation controlling the medical market and freezing out the general practitioner, is typical of this age of trusts and monopolies."

"Since the good old days when the word 'Doctor' expressed any value in hospital parlance, changes have come with a vengeance; the hospital has divorced itself from the doctor except to make him the tool with which to accomplish its purpose—a stepping-stone to advance its interests."

"What is the motive of the surgeon in working for nothing for a gigantic business concern that could well afford to pay him for his services?"

"The situation as it is: The governor in the saddle and the volunteer corps, the visiting staff, sullen, and mutinous."

"The day the hospital reached its majority and set up a household of its own, it should have crowned its entrance into manhood by paying every man, in whatever capacity attached to the hospital, the market value of his services."

"The old notion that surgeons and physicians should work for nothing for rich corporations styling themselves hospitals and who wear the trade-mark, charity, to deceive the unwary, is about exploded."

"The handwriting on the wall is becoming apparent; the peril of the governor is growing more and more imminent."

DR. F. W. HIGGINS of Cortland County read a paper, entitled

## SENILITY.

He insists on the distinction between senility and senescence, between the gradual expansion of Nature's forces

that constitutes the "natural disease of all life," and that degeneration of the cellular elements of the organism, often precocious, usually brought on by abuses of which alcoholism is one of the most prominent. Senility does not constitute a contraindication of operations, but senescence does, no matter what the age of the patient determined from his years.

DR. THOS. F. REILLY of New York County read a paper on

## THE TECHNIC AND USE OF SALINE INFUSIONS.

He demonstrated the funnel, tube, and cannula for intravenous injection and dwelt on its usefulness. The intravenous injection of a pint or more of warm normal salt solution now constitutes the best remedy for surgical shock, for exhaustive hemorrhage, for uremia (some blood being taken away if deemed advisable before the injection, this method being what the French call washing out the blood), for diabetic coma (the benefit reported from the injection of bicarbonate of soda being probably due to the salt solution); in all serious toxemias, whether digestive in origin, or septic, or due to the ingestion of some vegetable or mineral poison; in acute suppression of urine, and in all conditions of lowered blood-pressure, also in apparent deaths from electricity and the like.

After the discussion of Dr. Reilly's paper the Association adjourned.

## NEW YORK ACADEMY OF MEDICINE.—SECTION ON GENERAL MEDICINE.

*Stated Meeting, Held Tuesday, October 18, 1898.*

THE Chairman, DR. LOUIS FAUGERES BISHOP, read an address, entitled

## THE EVOLUTION OF SCIENTIFIC MEDICINE.

He said in part:

The fact cannot longer be ignored that great changes have taken place in the economic relations between physicians and the public. It has long been apparent that as a means of earning a livelihood and of winning a desirable position in a community, the profession of medicine does not offer the inducements to us that it offered to our forefathers. It would seem that the work of the average man has become more definite and clearly defined. We have come to do, each of us, some particular branch of our art better than in former times. In other words, the physician and surgeon has become more of an artisan and less of an artist. The artist constructs from his imagination—he idealizes. The artisan performs a definite work from carefully drawn plans. Even in departments of medicine that it would seem impossible to render scientific, such as mental diseases, the classification has advanced and recorded experience been accumulated until even the alienist can work according to rule.

But the evolution of the profession has also been affected by forces from without. The relation of the physician to the community has been profoundly modified by the general progress of knowledge and the extension of science and learning to so many fields of hu-

man activity. The number of professions in the true sense of the word has been enormously extended. The management of special commercial enterprises, such as railroads, electric systems, great financial corporations, and manufacturing companies, is no longer entrusted to chance employees, who have acquired skill merely through experience, but is conducted by persons especially trained in engineering and technical science. Professional training has become so diversified that the physician finds himself only one of a great many who are set apart to do a particular work because of special education. In the beginning the trades and business were far removed from science and the systematic improvement which comes through development along the lines of exact observation and inductive reasoning. Medicine also was involved in superstition and supported by authority rather than reason. As time has gone on the conduct of all human affairs—commercial, social, and even religious, has come under the dominion of the scientific tendency of the age which leads to simplification of method and organization of effort. At the same time medicine has thrown off mysticism, secrecy, and reliance upon authority. So the public at large and physicians as a class have come near together, and the physician finds himself one of the large number of specialists and subservient to much the same laws as the others. As a laborer, he must find a market like his friends, the electric engineer and the rest, and must be governed by the same laws of fitness, supply and demand. Pressure of circumstances will compel him more and more to conduct the business side of his work in conformity with scientific business methods. In fact, to be unbusiness-like is to controvert the order of the just relations of man to man. Business in its best development is more highly moral than many a system of theology.

A great disturbing element in the business relations of physicians is philanthropy. The physician has more opportunities than others to exercise this faculty, and he also must be acknowledged as having more chances as an individual for gain by the wrongful exercise of the privilege of gratuitous service. He benefits himself but injures the business possibilities of other members of his profession. The same selfish principle is seen in the commercial world when large department stores sell without profit a class of merchandise which they do not care to handle except to induce crowds to come to their bazaar but which represents the means of livelihood of a large number of small shopkeepers. In this way, for the sake of prestige and experience, the older physician may injure the younger man, as witness the hospital and dispensary abuse. But fortunately philanthropy has not escaped the modern scientific fact that charity must be controlled by fixed principles and not left solely to the impulse of the emotions. Organization cannot long be deferred. Philanthropy is seeking more and more the guidance of principles and facts developed by scientific method in observation and experiment.

The tendency in America is to give up all sects in medicine and allow physicians to choose their professional associates purely on the ground of integrity and personal

preference. This liberal and scientific spirit has found its chief growth in New York State with the result that the controversial side of medicine has been abandoned for the scientific. New York may well be regarded as the center of influence of a modern school of scientific medicine, and a monument has already been raised to it in the amount of good work in investigation and analysis which has been done. The modern school of scientific medicine relies for its recognition and support upon a public educated in modern philosophy, a public dominated by the scientific spirit of a scientific age. It claims as an advantage that medical knowledge should be open to any curious seeker and that many medical facts should be of the common knowledge of the people. The public has already acquired that little knowledge which is so dangerous. It will not give it up. Our only salvation is to go boldly forward and educate the masses to a point where they themselves can discriminate between knowledge and imposition. The enemies of medicine have already entered upon a flank movement and the newspapers are blackened with advertisements of serums, extracts of organs and germ-killers, some of which assume the names of great discoverers. This movement of charlatanism was only to be expected and must be met by training the people to distinguish between science and fraud.

DR. R. H. CHITTENDEN, Professor of Physiological Chemistry in Columbia University, then read a paper on

#### THE RELATION OF CHEMISTRY TO PRACTICAL MEDICINE, AND SOME OF THE METHODS AVAILABLE IN THE DAILY WORK OF PHYSICIANS.

Physiological chemistry began to occupy a proper place in the scheme of medical studies only when the first independent laboratory was established in the Strassburg University twenty years ago. Since then every new fact which the laboratory has brought to light has added something to the fund of knowledge which is of practical value to the general practitioner, and the advance in the application of chemistry, physiology, and pathology has been so great as to warrant the expectation that further progress in scientific medicine will be along chemical lines in future. It has been shown that micro-organisms are not directly responsible for the ills which they produce, and that the characteristic symptoms are but the outward manifestations of the physiological action of the specific substance produced by the growth and multiplication of these organisms within the tissues of the body. It is now known that the Loeffler bacillus produces a soluble poisonous substance of a proteid nature which, when injected, will produce the characteristic symptoms of diphtheria and death. The production of an antitoxin which owes its antidotal action to chemical substances has been made possible by combined chemical and physiological study. According to Ehrlich the diphtheria toxin is a single definite compound with definite physiological and antitoxic properties as its origin only; it is instable, and the neutralizing power of a fatal dose varies greatly in different toxins. The latter readily deteriorate. Chemistry has shown that the growth of both pathogenic and non-pathogenic micro-organisms is accompanied by the devel-

opment of proteolytic enzymes, which are responsible for the soluble proteid products which result. The most prominent of these are albumoses or proteoses, and resemble those formed by the proteolytic enzymes of the digestive juices, which are toxic when introduced into the circulation. The soluble products of digestion when introduced into the blood-current are rapidly eliminated through the kidneys as are other poisons. In the decomposition of proteids by ordinary digestive fluid, enzyme, there takes place a progressive hydrolytic cleavage in which the first formed products (primary proteoses) become secondary products (secondary proteoses), and finally are transformed into true peptones. As a rule, the primary are much more active than the secondary products. The same thing occurs in the zymolysis, produced by many pathogenic micro-organisms. A corresponding hydrolytic cleavage results with the formation of a more or less toxic substance, one formed from the other by successive hydration, and accompanied by changes in toxicity or physiological power. All pathogenic bacteria produce a row of chemical substances possessed of more or less toxicity, to which are due the characteristic symptoms of the disease.

One can no longer doubt the existence of a row of chemical substances elaborated by the various ductless glands, such as the thyroid, which exert a controlling influence over the nutritional processes of the body, preventing the formation or counteracting the effect of powerful toxic substances. There is evidence to prove that chemical substances of undoubted physiological power are contained in the internal secretion of the thyroid, suprarenals, hypophysis cerebri, ovaries, testicles, etc.

The practical value to the physician of the chemical study of food, urine, and feces, as bearing upon the general problem of nutrition, cannot be overestimated. Quantitative analysis, in order to ascertain the true nutritive value of food and the extent of metabolism, will prove of inestimable value, and afford a basis for accurate diagnosis in questionable cases. It is to be hoped that the time will come when the same amount of thought as that given to the prescribing of medicines will be devoted to determining the exact nature and composition of food. Kjeldahl's method is simple and accurate in determining the nutritive value of the proteid and albuminous foods by detecting the amount of nitrogen present.

It is interesting to note the different forms in which nitrogen is eliminated in the urine, and much may be learned in this way. The quantitative method of Hopkins will determine sufficiently for clinical purposes the amount of uric acid excreted.

It is now known that uric acid has an origin quite apart from urea. Kossel has shown that true nuclein yields on decomposition a row of xanthin bases which contain an alloxin group and an urea group, and uric acid is an alloxin body. Foods which contain nuclein increase markedly the output of uric acid, and the continued excretion of uric acid during prolonged periods of fasting is largely due to katabolism of the nuclein-holding cells of the organism. The great increase in the excretion of uric acid

in leucemia is undoubtedly due to the destruction of leucocytes which are rich in nuclein.

In determining the presence of urea with sodium hypobromite, it should be borne in mind that the latter decomposes other nitrogenous constituents as well as urea.

Of creatinin but little is known except that it increases under a meat diet.

Both leucin and tyrosin are pathological constituents of urine, and are the normal products of pancreatic digestion. They appear in the urine whenever the functional activity of the liver cells is interfered with, but are not pathognomonic of acute yellow atrophy of the liver as has been supposed. These substances should be sought for in the urine in cases of jaundice.

The presence of melanin does not necessarily point to the existence of a melanotic tumor.

Originally it was thought that the diazo-reaction of Ehrlich was pathognomonic of typhoid fever, and Ehrlich believes it to be of clinical value, but it has been shown that chemogen, the cause of the reaction, is found in other febrile diseases, and particularly in pulmonary tuberculosis.

Indican, which ranks first among the normal chemogens of the urine, is the product of oxidation of the indol formed in intestinal putrefaction. Micro-organisms in the intestinal tract are alone responsible for the formation of indol and its subsequent appearance as indican in the urine. Consequently the amount of indican found in the urine will indicate the extent of intestinal putrefaction. Indican is also present in the urine in nearly all cases in which there is hyperacidity of the gastric juice.

The presence of acetone and diacetic-acid in the urine is of special significance to the physician, for they owe their origin to the breaking down of the proteid matter of the tissues, and are, therefore, conspicuous in cases in which inanition is marked.

In testing for sugar the Bottger-Allmen-Nylander test should be employed in addition to the Fehling-test. The phenylhydrazin test is absolutely reliable and unerring.

The tests usually employed to detect albumin in the urine merely indicate the presence of albuminous matter without reference to the character of the proteid. Careful examination should determine this.

Ewald's test meal in gastric indigestion furnishes another example of the intimate relation between chemistry and practical medicine, the determination of total acidity, the relative proportion of free and combined hydrochloric acid, and the presence of lactic or other organic salts, now being made by various chemical tests.

Physiological and pathological chemistry are closely allied to physiology and pathology. The normal must be fully understood in order that the significance of the abnormal may be appreciated, for the dividing line is exceedingly thin and wavy. Many of the deviations from the normal which are the forerunners of disease, may be made clear by chemistry. It is to be hoped that the intimate relation which chemistry bears to scientific medicine may be more fully appreciated, and that the use of the many practical methods which chemistry offers as an aid to diagnosis may become more and more extended.

## DISCUSSION.

DR. BEVERLY ROBINSON: Much as I desire to express some views upon the subject of the relation of chemistry to practical medicine, I think it would be wise for me to decline to do so because I am not a chemist. I know very little about the chemistry of to-day, and I am not ashamed to say so for I believe the same is true of pretty nearly every practitioner of medicine. Fortunately for us, there are a few exceptions—men who have been able to combine with the art of medicine a great deal of scientific attainment. I do not claim to be such. I would like, however, to make some remarks in regard to why the practitioner knows little or nothing of chemistry. At the College of Physicians and Surgeons it is not necessary that a man know chemistry before beginning the study of medicine; therefore, unless he has been fortunate enough to have some preliminary training, he must get the best chemical knowledge he can during the first or second year of his college life. Now, the time is short and there are other things to learn besides chemistry, and it is pretty hard work. A man has no time for amusement and but little time for the exercise upon which his health depends. No one will deny that it is important to have a wide chemical knowledge, but the fact remains that it is impossible to do more than a certain amount of work during a certain number of hours. It would be wise for colleges to insist upon men receiving a preliminary training in physiological and pathological chemistry before beginning the study of medicine. So much for the colleges. Now for the hospitals.

I for one acknowledge that I, to-day, have to learn much from younger men—the hospital interne. I have a great respect for these young men, for they know a great many things which I do not know. I believe these young men should have the opportunity of perfecting themselves in bacteriology and physiological and pathological chemistry. I would have endowed laboratories in every hospital in the country with a competent man at the head of each. I certainly think that scientific research should be encouraged, and this can best be accomplished by the endowment of laboratories. I want it distinctly understood, however, that I, as a practitioner of medicine, do not propose now or in the future to allow any chemist or bacteriologist, never mind how wise, to tell me that he is to control the situation. I believe and always have believed that clinical medicine above everything should control all along the line. Let the chemists and bacteriologists bring their acquired facts to those of us who have made a life-work of the study of disease—it is for us to hold the fort. These men should not think that their varying science—for it is varying—can make up for years of clinical experience. And yet I do not want you to believe that I do not fully appreciate the immense advantages which have been gained by scientific research. I realize all that we owe to bacteriology and to chemistry.

DR. W. H. THOMPSON: When I was asked to come here to-night and take part in this discussion, I was at a loss to know what I was expected to talk about because of the fact that the subject practically covers the whole field of medicine to an extent which only those who pay

attention to the great problems of medicine can appreciate. Take for instance the question of infection. It was a great step when chemistry discovered that this was not due to direct contagion. Then we heard of bacteria and plasmodia, and this explained the period of incubation and the development of infection by a series of time-limited processes. It also solved the still greater problem as to how these processes resulted in the proliferation of the infecting agents. It explained why different persons exposed to the same infection did not all fall a prey to it, because of the different nature of the soil on which the seed fell, and, finally, it explained that the disastrous effects which they produce are due to the products which they form. The practical physician wishes to know all he can about these subjects.

The author has discussed the methods of discovering certain ingredients of the urine, but can he promise us that chemistry will soon be able to come to our aid in answering the exceedingly puzzling questions in connection with uremia? I have failed to get a single hint from him on this subject. I know of nothing more difficult to understand than the kidney. One can remove two-thirds of both kidneys and they will secrete more urine and urea than before. If three-fourths of both organs are removed there is still an increase in the amount of urine and urea excreted, but this will be followed by emaciation and death. How can this be explained. Would you say that dropsy is due to a disorganization of the kidneys in a patient who has been passing a great deal of urine? How do you explain those cases in which the kidneys are not able to send a drop of urine to the bladder on account of, say, impaction? You will find it difficult when called into consultation to explain to the attending physician that the patient is sure to die, but will die without any symptoms or uremia—no vomiting, no convulsions, and with no albumin in the urine. Such patients die of asthenia as do animals who have had their ureters tied off. Chemistry has not yet given us an explanation for this.

Again, what is the significance of pale urine? It is easy to say that it is a sign of a nervous, hysterical condition. Others say that it is a pronounced sign of structural changes in the kidney. I always regard pale urine as a serious symptom in diabetes.

In regard to auto-infection, my experience has taught me to look upon intermittency as a sign of auto-infection. An epileptic or a person who suffers from periodical attacks of migraine might be brought before the best neurologists in the land, and they would not know that the first was an epileptic, unless he fell at their feet in a fit, or that the second was periodically prostrated by the most intense headaches. These intermittent nervous affections, which are characterized by absolutely no sign of their presence during the intervals between the attacks, are fundamentally different from affections due to structural changes. These nervous explosions, convulsions, attacks of asthma, migraine, etc., are explained by poison—auto-infection. I am satisfied that a further elucidation of this subject is to be found in the direction of chemistry. We cannot lay too much importance upon

chemical examination of the urine and contents of the stomach and intestines. I hope we will all take to heart what Professor Chittenden has been telling us about the gastric reactions. These are of especial value in typhoid fever.

I am gratified to hear Professor Chittenden lay emphasis upon the presence of indican in urine. A friend of mine has discovered that the administration of ether has a most disastrous effect upon the kidneys, very different from that which follows the administration of chloroform. Perhaps the presence of indican in the urine has something to do with this. In any case it should be recognized as a signal of danger.

DR. MORRIS MANGES: I regret that I did not hear the paper, but from what has been said in the discussion I infer that the relation of chemistry to diseases of the stomach has been referred to by the author. There is no organ more indebted to chemistry than the stomach. The analin dyes began to be used for testing the gastric juice less than twenty years ago. The reason why the general practitioner pays so little attention to intestinal chemistry is because he thinks the subject too complicated for him. In reality it is very simple, and the various tests can be carried out by anybody. Nothing is easier than the analysis of the contents of the stomach. A specialty should not be made of diseases of the stomach which belong to the field of the general practitioner as much as do diseases of the lungs, heart, and liver. If the schools would devote to the study of physiological chemistry one-half the time they give to the routine study of anatomy, and if students were compelled to study test-tube reactions instead of tracing the course of nerves and arteries—which are at once forgotten and can always be referred to in the books—physicians would be better able to practise medicine.

DR. ACHILLES ROSE: It seems to me that it would also be well to study the chemistry of respiration. As you all know, tuberculosis has been treated by inflation of the rectum with carbonic-acid gas, and it has been found that although a cure could not be effected, many of the symptoms were relieved by this treatment. No effect was produced upon the bacillus, but the patients coughed less, had less fever, and the general condition improved. This result is explained by chemistry. When the rectum is inflated with carbonic-acid gas the latter is introduced into the venous system, and is eliminated by the lungs. According to the law of diffusion the more carbonic-acid gas eliminated the more oxygen descends. This exchange of gas takes place in the alimentary canal, with the result that the tissues are enriched with oxygen. I have recently employed with good effect inflation of the rectum in a girl of sixteen suffering from chorea. Many things of therapeutic value may be learned from a study of the chemistry of respiration.

## REVIEWS.

DISEASES OF WOMEN: A MANUAL OF GYNECOLOGY. By FRANCIS H. DAVENPORT, M.D., Assistant Professor of Gynecology in the Medical Department of

Harvard University, Boston. New (third) revised and enlarged edition. Philadelphia and New York: Lea Brothers & Co., 1898.

In this enlarged edition of his popular book, Dr. Davenport has embodied the medical treatment of gynecological diseases as well as the surgical. The size of the volume precludes the possibility of pathological discussions and of descriptions of rare diseases, but, as heretofore, the work stands as one of the best, and by this we mean most lucid and scientific of the manuals which treat of the diseases of women. As a working-book for the student or the general practitioner there is none better. The book is profusely illustrated and handsomely printed.

A TEXT-BOOK OF PRACTICAL THERAPEUTICS, with Especial Reference to the Application of Remedial Measures to Disease and Their Employment upon a Rational Basis. By HOBART A. HARE, M.D., B.Sc., Professor of Therapeutics and Materia Medica in the Jefferson Medical College, Philadelphia. Seventh edition. Philadelphia and New York: Lea Brothers & Co., 1898.

THE necessity, within a year, of issuing a new edition of this work, now in its eighth year of life, is sufficient evidence of its worth and its popularity. As heretofore, the first part of the book deals with drugs and their therapeutic applications, as well as with therapeutic measures of other kinds, including baths, enemata, feeding, infusions, mineral springs, and climate. The second half of the book is devoted to a consideration of diseases, with a discussion of the drugs suitable for and indicated in the various ailments and their complications.

In the present edition the author has brought the book thoroughly up to date, and has made the preparations of drugs conformable to the British Pharmacopoeia as well as to that of the United States. We can, therefore, assume that his work will soon meet a popularity on British soil second only to that which it enjoys in this country. A number of new illustrations have been added. We shall not be surprised to see at an early date an eighth edition of this deservedly popular book.

OUTLINE OF PRACTICAL HYGIENE. By C. GILMAN CURRIER, M.D. Third edition. New York: E. B. Treat & Co., 1898.

THE book before us treats of a subject which evidently has been considerably neglected in several quarters if what we hear in regard to the selection and the health of military camps be true. A few words, such as found upon page 40, if acted upon would have saved many lives. The author here states in the chapter on soil and climate: "If camping out, the site should be dry, and not have water near the surface. . . . . Moist river bottoms and valleys are not to be chosen for camping-grounds." And further, on page 41, "Wherever one goes, it is important to see that the *water-supply* is very free from chances of contamination." There are many points contained in this work as important as those cited above which would be of benefit to health-officers and persons at the head of sanitary departments.

The chapters on heating and ventilation are of particular interest in view of the approach of winter, the season in which our homes are more or less in an unhealthy state owing to the erroneous methods employed.

Dr. Currier has incorporated in his book all of the most important points to be considered in public hygiene, and its perusal might be recommended to the medical profession as well as to the general public. A complete index completes the work.

**A CLINICAL TEXT-BOOK OF MEDICAL DIAGNOSIS FOR PHYSICIANS AND STUDENTS.** By OSCAR VIERORDT, M.D., Professor of Medicine at the University of Heidelberg. Authorized Translation by FRANCIS H. STUART, A.M., M.D. Fourth American, from the fifth German, edition. Philadelphia: W. B. Saunders, 1898.

AN extended notice of the fourth edition of this widely known book on medical diagnosis is scarcely called for. The pioneer in works of this character, Professor Vierordt's book has long held its own, and, during the ten years which have elapsed since it was first published, it has become a favorite with teachers and students as well as with the great bulk of the medical profession. It is a perfect storehouse of information on clinical and laboratory methods of examination and in this edition has been brought thoroughly up to the latest accepted teachings. We note especially that the chapters dealing with the examination of gastric contents, the nervous system, and the microscopic examination of the blood have been revised and enlarged. The translation has been admirably made, retaining the force and virility of the original without a sacrifice of clearness. The typographic appearance of the book leaves nothing to be desired.

**A TEXT-BOOK OF MATERIA MEDICA, THERAPEUTICS, AND PHARMACOLOGY.** By GEORGE FRANK BUTLER, Ph.G., M.D., Professor of Materia Medica and Clinical Medicine in the College of Physicians and Surgeons, Chicago. Second revised edition. Philadelphia: W. B. Saunders, 1898.

THE wisdom of the publisher is sometimes greater than that of the critic. We did not believe when this book passed through our hands two years ago that it would grow into a lusty youngster; we were inclined to think that its faults so overbalanced its virtues that it was not long for this life. But it seems we were prognostically wrong. The second edition, somewhat amended, lies before us. The author still uses the almost homeopathic phrases, "disease medicines" and "symptom medicines," whatever these may be, the same delusive illustrations are found scattered through the text and the same hazardous statements are here and there met.

But the book has much in it that is good. Especially is this true of the chapter on serum-treatment. Most of the text is in harmony with accepted teaching and as a text-book for the student it is safe. The make-up of the book is handsome, indeed. But we wish we could assist in revising the text when a third edition, which we hope may be necessary, shall appear.

**A GUIDE TO THE CLINICAL EXAMINATION OF THE BLOOD.** By RICHARD C. CABOT, M.D. Third revised edition. New York: William Wood & Co., 1898.

DR. CABOT's book must have hit the mark, for within two years a third edition has been demanded. We said when referring to the first edition, "it is a well-conceived, well-written, almost complete, hand-book," and we have nothing to retract. It is better now than it was two years ago for it contains most of what is new, and all that is good, of the discoveries in this branch of clinical medicine since the first edition was written. There are descriptions of Fliner's tintometer and hemoglobinometer, a description of Müller's blood-dust, the test by anilin colors of diabetic blood and blood examinations in some of the infectious diseases. We regret to find that the author still insists on holding the cover-glass with his fingers instead of with forceps; yet this is a mere detail.

The book is one of those one can heartily commend to every one who wishes to study the blood in a scientific spirit. It is a thoroughly scientific, thoroughly modern work on an important subject.

## THERAPEUTIC HINTS.

*For Diabetes Insipidus in Children.*—The following prescriptions are recommended by MONTI.

1. B	Quininæ sulphat.	gr. xx
	Zinci sulphat.	gr. v
	Sacchari	3 iiis.
M.	Div. in chart. No. XXX. Sig.	Five powders daily.
2. B	Liq. potassii arsenitis	3 i.
	Tinct. valerianæ	{ aa . . .
M.	Sig. Five to ten drops three times a day.	
3. B	Chloralis hydrat.	gr. xvi-xxvii
	Syr. acacie	3 iv.
M.	Sig. Three or four tablespoonfuls a day.	

The diet should be restricted to vegetables and milk or milk alone. Sweetened or salted foods should be avoided. Hot baths, moderate exercise, and mineral purgative waters when indicated are further noted for the course of treatment.

*For Infantile Chorea.*—

B	Acidi arseniosi	gr. iss
	Aq. dest.	3 iii.
M.	Sig. From one-half teaspoonful to seven teaspoonfuls a day.	

According to FILATON this is better tolerated than Fowler's solution or the arsenate of soda. Begin with  $\frac{1}{2}$  teaspoonful for a child of four to ten years, or 1 teaspoonful if over ten years, augment the daily dose during the first week, diminish it during the second, and so on. The maximum daily dose for the younger child is  $3\frac{1}{2}$  teaspoonfuls, for the older, double this quantity. If not borne by the stomach Filaton advises the use of Fowler's solution hypodermically in doses of  $\frac{1}{4}$  to  $\frac{1}{2}$  of a grain.